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An Update of the Status of
4X Flatfish Stocks

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¹La présente série documente les bases scientifiques des évaluations des ressources halieutiques sur la côte atlantique du Canada. Elle traite des problèmes courants selon les échéanciers dictés. Les documents qu'elle contient ne doivent pas être considérés comme des énoncés définitifs sur les sujets traités, mais plutôt comme des rapports d'étape sur les études en cours.

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Abstract

Up to and including 1993, flounders in 4VWX were managed as one stock complex with a TAC of 14,000 t. In 1994, the management unit was divided into an eastern (4VW) and a western (4X) component and the overall TAC was reduced to 10,000 t with 4,500 t allocated to 4X and 5,500 t to 4VW, based on catch history. Winter flounder was included in the western component. The 1995 management plan set a TAC of 7,500 t which was partitioned between 4VW and 4X, giving the eastern component a TAC of 4,125 t and the western component a TAC of 3,375 t. ITQs for flatfish were implemented in August 1994 in 4X, and Eastern Nova Scotia (ENS) ITQ licence holders were given the option to choose an ITQ system or a competitive fishery for flounder in 1995. Landings data continue to be unreliable with unspecified flounder making up 45% of the total flounder landings in 4X. Stock status evaluations were based on sampling the commercial landings for size composition, the commercial catch rate and effort for combined flounders, and survey abundance indices and size compositions by species.

Total landings for flatfish in 4X for 1995 amounted to 2,538 t, a decrease from 3,277 t taken in the 1994 fishery. Commercial catch rates for all flounders combined remained relatively stable, while total effort declined since 1992. Survey abundance for 4X winter flounder is still relatively high, although according to Industry reports it has declined in recent years, in localized areas. The situation for witch flounder includes a low weight per tow, fewer large fish in the population, and declining average weight. As well, landings declined even though witch commands a much higher price than other flounders. The American plaice and yellowtail resources appear to be stable or increasing. Although flounder abundance, with the exception of witch, does not appear to be declining, the extent of the decline in witch suggests protective measures are warranted. As well, the declines in local populations of winter flounder suggests a management plan that recognizes the existence of several population units is essential.

Résumé

Jusqu'à 1993 inclusivement, les plies des divisions 4VWX étaient considérées comme un complexe de stocks, administré en vertu d'un TAC de 14 000 t. En 1994, l'unité de gestion a été divisée en deux parties: la composante de l'est (4VW) et celle de l'ouest (4X); le TAC total a été réduit à 10 000 t, 4 500 t étant attribuées à 4X et 5 500 t à 4VW, d'après les antécédents de prises. De plus, la plie rouge a été incluse dans la composante de l'ouest. Le plan de gestion de 1995 incluait un TAC de 7 500 t qui a été divisé entre 4VW et 4X, soit 4 125 t pour la composante de l'est et 3 375 t pour celle de l'ouest. Des QIT ont été adoptés pour les poissons plats en août 1994 dans la division 4X, et les titulaires de permis de pêche des plies avec QIT de l'est de la Nouvelle-Écosse (ENS) ont eu la possibilité de choisir entre un régime de QIT ou une pêche pratiquée en concurrence en 1995. Les données sur les débarquements continuent d'être peu fiables, puisque des plies non identifiées composent 39 % des débarquements totaux de plies dans 4VW et 45 % dans 4X. L'état des stocks a été évalué à partir des échantillons de débarquements commerciaux prélevés en vue de mesurer la composition par taille des espèces, les taux de prises commerciales et l'effort pour toutes les plies, ainsi que les indices d'abondance des relevés et la composition par taille, selon les espèces.

Le total des débarquements de poissons plats dans la division 4X en 1995 s'est chiffré à 2 538 t, soit une baisse par rapport aux 3 277 t de 1994. Les taux de prises commerciales de toutes les plies combinées sont demeurés relativement stables, tandis que l'effort total a diminué depuis 1992. L'abondance des prises de plie rouge dans la division 4X selon le relevé est encore relativement élevée, bien que, selon les rapports de l'industrie, elle ait diminué ces dernières années dans certaines zones localisées. La situation de la plie grise révèle un faible poids par trait, un nombre inférieur de gros poissons au sein de la population et une baisse du poids moyen. En outre, les débarquements ont diminué, même si la plie grise obtient un bien meilleur prix que les autres plies. La plie canadienne et la limande à queue jaune semblent stables ou en hausse. Même si l'abondance des plies, exception faite de la plie grise, ne semble pas diminuer, l'ampleur de la baisse de la plie grise semble justifier des mesures de protection. De plus, la diminution des populations locales de plie rouge montre qu'il serait essentiel d'élaborer un plan de gestion qui tienne compte de l'existence de plusieurs unités de population.

INTRODUCTION

Four species of flatfish, excluding halibut, are exploited commercially in 4X. These include:

- American plaice (Hippoglossoides platessoides)
- Yellowtail flounder (Limanda ferruginea)
- Witch flounder (Glyptocephalus cynoglossus)
- Winter flounder (Pseudopleuronectes americanus)

Of these, only plaice, yellowtail, and witch were under quota management between 1973 and 1993. An initial combined flatfish TAC of 32,000 t for 4VWX flounder was established in 1973, based on yield per recruit calculations (Halliday 1973) and reduced to 28,000 t in 1976 (Halliday 1976). A TAC of 14,000 t was established in 1978 in response to the removal of the foreign fishing effort (Anon. 1977). Subsequent examinations of the stock status through to 1985 did not provide a basis for modification of the TAC. FRCC advice for 1994 was to maintain the 14,000 t TAC.

Based on the analysis of biological parameters (Neilson *et al.* unpublished) it was recommended that the flatfish stock complex be divided into a western (4X) and an eastern (4VW) stock component. Industry was in agreement with new stock components for 1994, especially with the imminent implementation of ITQs. Science and industry also supported the inclusion of winter flounder under quota management and the reduction of the TAC from 14,000 to 10,000 t in 1994, to reflect the decrease in overall landings by all fleet sectors since the mid 1980s. The reduced TAC was also put in place to prevent increased effort in 1994 due to the 4VW cod moratorium. As these actions significantly altered the previous management of the 4VWX flounder stocks, a review of the fleet sector shares was initiated in 1994. In the interim period (January 1 - March 31, 1994) the fleet operated on a quota cap, which was based on their 1991-1993 catch average, from January 1 - March 31. The ITQ fleet held the position that the TAC be divided among the different fleet sectors based on catch history (due to their dependence on the fishery since 1986), while the offshore insisted that traditional quota shares be maintained.

After the fleet sector review, the traditional sharing formula (established in the groundfish Management Plan for the 4VWX quota) was upheld and applied to the area quotas for the original three species, i.e. plaice, witch and yellowtail (PWY) (51% offshore and 49% inshore) in each area. This excluded winter flounder as it had not previously been under quota management. As this species had historically been fished only by the inshore in 4X, the entire amount was allocated to the inshore fleets. Thus, the Scotian Shelf TAC was composed of 7,000 t of plaice, witch and yellowtail and a 3,000 t 4X winter flounder quota (based on catch history) totalling 10,000 t for 4VWX. This was then further divided, using catch history, into the 5,500 t in 4VW consisting of PWY and the remaining 4,500 t for 4X consisted of 1,500 t PWY and 3,000 t of winter flounder. The 1,500 t in 4X of PWY was allocated using traditional shares. The remaining 3,000 t for winter flounder was allocated only to the inshore. Only traditional shares were used to allocate the 5,500 t in 4VW for all fleet sectors. Winter flounder is not fished to any great extent in 4VW and was not put under quota in 1994.

The new quotas in each area for the ITQ fleet were 3,614 t in 4X and 2,088 t in 4VW. For 4X this quota approximated their traditional catch but for the ITQ fleet in 4VW it represented only about 60% of their recent landings. ITQs for 4X flatfish were implemented in August 1994.

The 1995 Management Plan was set at a TAC of 7,500 T which was again partitioned between 4X and 4VW giving the western component a TAC of 3,375 t. For 1996 the FRCC recommended maintaining the status quo in 4X.

Data Problems

Management of the four species together under one TAC reflects the fact that it has to date, been impossible to obtain reliable statistics on landings for each species. A system initiated in the late 1960s, which assigned landings to species based on regional keys, which equated local names with official ones was abandoned in 1991 as being outdated. However, the system which replaced it (ITQ logs and dockside monitoring of landings) was not successful in assigning landings to individual species except in a very limited way, because landings were not separated at weighout or were misidentified by the weighmaster (e.g. American plaice were called flounder). Separation by species, although requested formally by Statistics Branch in 1993 (letter to ITQ holders and weighmasters) was never enforced. The absence of reliable landing statistics makes it impossible to determine the level of exploitation for each species.

For 1994, the FRCC recommended that more effort be put into obtaining better landings data by species and area. While the official move to separate stock areas and the implementation of ITQs addressed some of the problems, landings data by species, for flatfish are still considered to be unreliable. With the failure of the ITQ and weighmaster system to effectively capture the required landings information, it will be necessary to make it mandatory for fishermen to separate flounder by species.

An improvement occurred in the 1995 flounder fishery and unspecified flounder made up only 45% of the total compared to up to 80% in previous years.

4X Flatfish

Description of the Fishery

Total landings of 4X flatfish increased to 6,015 t in 1990 and then declined to 2,538 t in 1995 (Table 1, and Figs.1, 2). Table 2 gives a breakdown of landings for each species by country since 1961. Canada is the major exploiter of the resource while the USA accounted for a small portion of the landings prior to 1984. Unspecified flounder made up between 60% and 80% of the 4X landings in recent years, however in 1995 this dropped to 45%. This shift is likely due to better identification by both fishermen and weighmasters and through more separation of flounder by some plants.

Figures 3 to 12, give the recorded landings by area, species and, gear and Tables, 3, 4 and 5 the recorded landings by area, season, gear, and tonnage class. However, because the species breakdown is not considered reliable this information can be discussed only in terms of total flounder landings by area.

Total landings of flatfish in 4X for 1995 amounted to 2,538 t, a decrease from 3,277 t taken in the 1994 fishery. Unspecified flounder made up 45% of the total flatfish landings in 4X down from 67% in 1994. Flatfish landings by the mobile gear <65' fleet declined by about 20% from 3,052 t in 1994 to 2,472 t in 1995. The <65' mobile gear fleet are responsible for over 90% of the total flatfish landings in 4X.

Offshore landings have been insignificant in 4X since the early 1980s (i.e. less than 100 t annually). Fixed gear landings in 4X decreased from 214 t in 1994 to 52 t in 1995. Landings by both longline and gillnet vessels declined significantly.

Discussions with industry participants indicated that the reason for not catching the entire 1995 quota could be due to some redirection of effort by the <65' mobile gear fleet to the yellowtail fishery on Georges Bank. Witch flounder continues to be a concern to the ITQ fleet with both larger concentrations and larger fish more difficult to find. Concern was also expressed by industry of declines in localized populations of winter flounder.

Landings to March 27, 1996, from quota reports for 4X, show a preliminary catch of 300 t taken by the <65' mobile fleet. In the same time period in 1995 the ITQ fleet landed about 450t. This slow start to the 1996 fishery may be related to the 10% bycatch restrictions on non traditional species, market conditions, the continued lower quotas in other groundfish, etc.

Management

The 4X flatfish fishery is currently regulated by quotas on the following gear sectors: 1) fixed gear <65'; 2) mobile gear <45' Generalist; 3) mobile gear < 65' ITQ fleet; 4) mobile gear 65-100', and 5) vessels >100'. Because the flatfish fishery has been a bycatch fishery in the past, trip limits and specific licence conditions were not required to manage the fishery. Flatfish in 4X were put under the ITQ program in August of 1994. Allocations for the gear sectors for the 1995 fishery are given in Table 6. The inshore mobile gear fleets took over 90% of their quota as did the midshore while the offshore fleet took only 7% of their allocation and much of that was taken by inshore vessels fishing under the Temporary Vessel Replacement Plan (TVRP).

Research Survey Data 4X

Winter Flounder

Survey Catch Rates and Distribution

The summer RV survey (1970-1995) stratified mean numbers per tow for 4X winter flounder

exhibited an overall increasing trend from the late 1970s to the early 1990s. A stable period was observed through the early 1980s with a subsequent increasing trend to 1992, and the 1993 to 1995 estimates have declined (Table 7 and Fig. 13) but are above the long term mean. Mean weights per tow and minimum biomass estimates exhibit a similar trend (Tables 7, 8 and Fig. 14).

It should be noted that the summer survey does not cover the inshore portion of 4X, which is believed to contain a large portion of the winter flounder stock.

Examining the survey mean weight per tow divided by the mean number per tow, suggests that the mean weight of winter flounder in 4X has remained relatively stable or declined slightly after a significant decline observed in the late 1970's (Fig. 15).

The summer survey distribution of winter flounder appears to be restricted to the Browns Bank area and the Bay of Fundy (Fig. 16). Catch rates on Brown's Bank were higher than in 1994. It is uncertain whether there is mixing between these two areas. Cooperative tagging studies with industry were initiated to determine the extent of the movement of winter flounder. However few returns have been recorded out of the 600 fish tagged to date.

Length Frequencies

Survey length frequency distributions (1970-1995) indicated a high abundance of < 35 cm fish which increased in the mid 1980s and has remained stable since. This is supported by a considerable increase in the < 20 cm group in the mid 1980s which also remains high. (Fig. 17). The number of winter flounder > 45 cm has declined over time and the proportion of fish >35 cm has declined based on the population growth due to recruitment. To examine the recent size composition, survey length frequency distributions for 1995 were compared to the 1990-1994 average. No significant changes were noted.

Witch Flounder

Survey Catch Rates and Distribution

The summer RV survey (1970-1995) stratified mean numbers per tow for 4X witch flounder were highly variable through the 1970s. Since the early 1980s, the survey has shown a declining trend (Table 7, Fig. 18). The stratified mean weights per tow and minimum biomass estimates in 4X also show a declining trend since 1980 and both the numbers and weights in recent years are below the long-term mean (Tables 7, 8, Fig. 19). The small increase in numbers per tow since 1992 as well as the length distribution indicates some incoming recruitment. To provide a view of the abundance of larger and smaller fish in the 4X area, an estimate of the mean weight of witch flounder was examined by dividing the mean weight per tow by the mean numbers per tow. Results indicated that the mean weight has been generally between 600 and 800 gm. For 1992 and 1993 mean weight dropped below 500 gm, and in 1995 the second lowest value in the series was observed (Fig. 20).

Summer survey distributions of witch flounder abundance indicated that they are widely

distributed in 4X, and in low concentrations. The 1995 distribution was similar to 1994 (Fig. 21).

Length Frequency

Survey length frequency distributions (1970-1995) indicated that far fewer large witch flounder have been caught in recent years (Fig. 22). The 1995 survey length frequency distributions were compared to the 1990-1994 average. Since 1990, although the survey caught more <20 cm fish in 1995, the number of fish >45 cm has declined and in 1995 are virtually absent from the population. Fish in the 35-40 size range increased in abundance in the 1995 survey and likely account for the shift to a slightly larger size in the commercial length frequency.

Yellowtail

Survey Catch Rates and Distribution

The summer RV survey abundance estimates (1970-1995) for 4X yellowtail flounder have increased since the early 1980s. Mean numbers and weights reached a peak in 1994 and have remained at relatively high levels in 1995. (Table 7, 8 and Figs. 23, 24). The mean weight per fish for yellowtail has remained relatively stable over the time series (Fig. 25)

Yellowtail survey distribution in 4X is generally limited to the Browns Bank area and the mouth of the Bay of Fundy. No significant changes in distribution were noted in the 1995 survey (Fig. 26).

Length Frequencies

Survey length frequency distributions (1970-1995) are highly variable and may be reflective of the low catch rates (Fig. 27). The 1995 survey length frequencies were compared to the recent 1990-1994 average. The 1995 survey size composition suggest an increase in yellowtail >30 cm, and decreased numbers in the 20-30 cm range .

American Plaice

Survey Catch Rates and Distribution

American plaice survey abundance estimates in 4X were relatively stable over the entire time series; mean numbers indicate a variable but increasing trend since the early 1970s with the 1995 value among the highest in the series (Tables 7, 8, and Figs. 28, 29). As a result of the increase in numbers and relative stability in weight per tow, the mean weight per fish for plaice has gradually declined since the early 1980s (Fig. 30).

The summer survey distributions show a similar pattern to earlier years with small concentrations

between Browns Bank and Roseway, as well as the Bay of Fundy (Fig. 31).

Length Frequencies

Survey length frequency distributions (1970-1995) show little change in recent years; however, there are currently fewer large plaice in the population when compared to the 1970s and 1980s. (Fig. 32). The 1995 distributions were compared to the 1990-1994 average. Little change was seen in size composition except for the presence of relatively large numbers of small (<10 cm) plaice.

Commercial data

Commercial Catch Rates

Directed catches for all stocks comprising the 4X flatfish complex are variable and often at very low levels. The landings with effort, for each species were examined for the 1989 to 1995 time period. Identified landings in some years were less than 5 t. With the bycatch nature of the fishery (though less so as other stocks decline), the increasing problem with unspecified flounder and the change in the way the statistics are reported, the use of commercial catch rates for individual species in evaluating the status of the flatfish stocks are likely of limited value. Catch rates were derived for the individual flounder species and combined flounder, for the whole year for mobile gear <65'. This approach was used to circumvent the problems with species identification. Commercial catch rates for all 4X flounders combined declined between 1989 and 1992 and has remained stable since then, while total effort declined significantly since 1992 (Table 9 and Figs. 33a.). In 1989 the 4X fishery was closed in June resulting in both low catch and effort in that year. Effort on flatfish increased to 1992 possibly due to the introduction of ITQs, and interest by the ITQ fleet in developing a catch history in flatfish. For witch flounder, catch rates increased between 1989 and 1991 with effort relatively stable. In 1992, coincident with high landings catch rate declined and effort increased significantly (Fig. 33b). Catch rate has continued to decline while effort after the peak in 1992 has declined back to pre 1992 levels while catches declined sharply. Reports from 1994 indicated that a redirection of effort to Georges Bank yellowtail may have occurred, however in 1995, given the reduced 400 t quota, this should not have been a major factor. Industry indicated that restrictions in other fisheries (e.g. quota, closed areas) may have impacted the fleets ability to fish flounder.

Fishery Distribution

Distribution was examined using available log information, that included the lat and longs of the catch (Figs. 34 to 38). Unfortunately, most of this information pertains to unspecified flounder and only a small subset to individual species. If these subsets can be considered representative of the commercial distribution in 4X it would suggest that winter flounder are fished around the Browns Bank area up into the Bay of Fundy. However, unspecified flounder distributions, corroborated by industry indicate that winter flounder is fished in many small bays and inlets around the coast, especially in the inshore portion of the Bay of Fundy. The fishery distribution

of witch flounder is more wide spread and industry indicated that the fishery occurred predominantly in depths greater than 100 fathoms. There is very little directed fishing for plaice or yellowtail in 4X.

Fishery Length Frequencies

Commercial length frequencies for winter and witch flounder were examined for 1990 to 1995 and 1993-1995 for American plaice. Sampling for winter flounder was inadequate in 1994, however improved in 1995 (Table 10). With the addition of the 1995 length frequencies, the apparent shift toward smaller fish observed in 1993 and 1994, is not sustained (Fig. 39). Some variation is noted from year to year as cohorts move through the fishery. Plaice represent a small portion of the landings and the short time series of commercial length frequencies available is based on only one or two samples. Yellowtail also represents a small portion of the landings and a time series of commercial length frequencies was not available. Overall in the 1990s, while some variation was noted, no sustained trends were observed. Comparing the survey and commercial length distributions indicated that while both winter and witch flounder were caught at size ranges observed in the survey distribution, plaice were caught generally outside the size range commonly observed in the survey. Industry comments indicated that discarding was not a problem in the 4X flatfish fishery despite the discrepancy observed in the survey and commercial size frequencies.

Conclusions

The 1995 catch allocation to the major participants in the 4X flounder fishery (i.e. the <65' mobile gear fleet) did not restrict their fishing activities, but nonetheless landings declined by about 20% from the 1994 level. Industry indicated that restrictions in other fisheries (e.g. quota, closed areas) may have impacted the fleets ability to fish flounder. Catch rate for all combined flatfish remained relatively stable, however catch rate for witch flounder has declined since 1991. Reduced landings may be accounted for primarily by a reduction in overall effort, however witch effort did not decline even though industry indicated some difficulty in catching both witch and winter flounder in some areas. Reports in 1994 indicated a redirection of effort to Georges Bank yellowtail, however given the 400 t quota limit on Georges Bank yellowtail in 1995, redirection of effort to this species should not have been a big factor, as most participants fished only one trip for Georges Bank yellowtail.

Abundance of the primary species fished in the area, winter flounder, and also the two species of minor importance, plaice and yellowtail, appears to be stable, although winter flounder has declined since 1993. Witch flounder, however continues to decline in abundance. The size distribution has been relatively stable in the 1990-1995 period although for witch and to a lesser extent winter flounder there has been a significant decline in the abundance of large fish in the 1990s. Some industry groups have expressed concern about some localized winter flounder stocks, and have indicated that good concentrations of large witch flounder are increasingly hard to find.

Prognosis

Overall, resource prospects for 1997 remain reasonable for most of the 4X flounder resource. With the exception of witch flounder, resource status does not appear to have deteriorated and some recruitment was noted. The TAC of 3,375 t in 1996 should maintain effort at the 1994 level, and could even result in some further reduction, if, as in 1995, the entire quota is not taken.

However as previously noted witch flounder provides an exception, and the extent of the declines in survey abundance, commercial landings, catch rates and size range suggest protective measures directed at witch flounder are warranted for the 1997 fishery. Continued catches in the order of 300-400 t will likely cause a continuation of this downward trend. Innovative management may be required to limit effort on witch flounder while still permitting fishing for other flounders.

Some industry groups continue to express concern about some localized winter flounder stocks. As was stated last year, given that these winter flounder populations are highly localized, and the extent of mixing is unclear, every effort should be made to distribute catch among these populations. Consideration should also be given to developing a management plan that recognizes the possibility of several population units that may be changing abundance at different rates.

Separation of flatfish by species continues to be a problem, and should be resolved by enforcing the separation of flatfish as a condition of licence. The less desirable alternative is to try and use information provided by the subsequent plant weighout by species. Currently this information is not provided to Statistics Branch. Perhaps the DMP could be used to facilitate the collection of species weights from the plants.

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Table 1. Official Reported* Landings of 4X Flatfish by Species.

	4X					Total
	Winter Flounder	Witch Flounder	Plaice	Yellowtail Flounder	Unspecified**	
1961	699	59	198	9	25	990
1962	449	61	242	24	120	896
1963	614	75	250	84	-	1023
1964	1280	257	512	150	-	2199
1965	1128	421	694	224	-	2467
1966	1257	224	726	166	-	2373
1967	902	383	1106	225	-	2616
1968	1143	735	946	205	1	3030
1969	1400	792	870	201	-	3263
1970	1478	807	635	326	2	3248
1971	1483	1141	545	218	1	3388
1972	825	698	566	164	681	2934
1973	774	535	339	139	806	2593
1974	974	498	458	236	716	2882
1975	670	331	296	213	834	2344
1976	717	341	309	230	496	2093
1977	1022	421	449	302	898	3092
1978	884	188	512	387	1027	2998
1979	847	290	828	291	1212	3468
1980	1134	331	682	255	1858	4259
1981	1411	462	514	227	1556	4170
1982	1144	583	377	212	1763	4079
1983	915	659	584	321	2023	4502
1984	877	593	335	172	1995	3972
1985	795	525	317	73	2200	3910
1986	1034	631	592	111	3234	5602
1987	1044	492	262	109	2380	4287
1988	1460	541	366	79	2205	4651
1989	1289	527	481	50	976	3323
1990	1881	643	469	79	2943	6015
1991	602	605	988	144	3445	5784
1992	564	824	413	118	3940	5859
1993	343	373	9	54	3232	4011
1994	520	391	82	95	2189	3277
1995	923	306	27	133	1149	2538

* Landings by species are not considered reliable, due to lack of consistent species separation.

** Any mixture of winter, witch, yellowtail or American plaice.

Table 2. Official Reported Landings for 4X (includes 5Y).

	Winter Flounder					Witch Flounder				
	Canada	USA	Russia	Other	Total	Canada	USA	Russia	Other	Total
1961	696	3	-	-	699	36	23	-	-	59
1962	443	6	-	-	449	24	37	-	-	61
1963	586	28	-	-	614	29	46	-	-	75
1964	1251	29	-	-	1280	187	70	316	-	257
1965	1103	4	21	-	1128	56	49	124	-	421
1966	937	8	312	-	1257	80	20	-	-	224
1967	884	18	-	-	902	291	92	12	-	383
1968	1115	13	15	-	1143	694	29	7	1	735
1969	1388	7	5	-	1400	756	28	-	-	792
1970	1470	8	-	-	1478	760	47	317	-	807
1971	1418	6	59	-	1483	775	49	95	-	1141
1972	792	13	20	-	825	563	40	120	-	698
1973	633	2	139	-	774	383	32	97	-	535
1974	751	7	216	-	974	373	28	13	4	498
1975	615	45	10	-	670	281	33	27	-	331
1976	696	13	8	-	717	285	29	6	-	341
1977	1009	13	-	-	1022	402	13	-	-	421
1978	879	5	-	-	884	172	16	-	-	188
1979	844	3	-	-	847	283	7	-	-	290
1980	1133	1	-	-	1134	320	11	-	-	331
1981	1411	-	-	-	1411	421	41	-	-	462
1982	1139	5	-	-	1144	527	56	-	-	583
1983	912	3	-	-	915	482	177	-	-	659
1984	870	7	-	-	877	431	162	-	-	593
1985	794	1	-	-	795	452	73	-	-	525
1986	1031	3	-	-	1034	553	78	-	-	631
1987	1024	20	-	-	1044	472	20	-	-	492
1988	1459	1	-	-	1460	529	12	-	-	541
1989	1289	-	-	-	1289	524	3	-	-	527
1990	1885	1	-	-	1886	638	7	-	-	645
1991	602	1	-	-	603	602	3	-	-	605
1992	564	-	-	-	564	828	1	-	-	829
1993 ⁽¹⁾	343	-	-	-	343	373	-	-	-	373
1994 ⁽¹⁾	520	-	-	-	520	391	-	-	-	391
1995 ⁽¹⁾	923	-	-	-	923	306	-	-	-	306

⁽¹⁾ Foreign catch is provisional, from International Observer Program and NAFO Circular Letters.

Note: Data from 1991 onward, is from DFO Statistics Branch.

, Table 2 (Continued). Official Reported Landings for 4X (includes 5Y).

	American Plaice					Yellowtail Flounder				
	Canada	USA	Russia	Other	Total	Canada	USA	Russia	Other	Total
1961	151	47	-	-	198	-	9	-	-	9
1962	187	55	-	-	242	4	20	-	-	24
1963	150	100	-	-	250	25	30	29	-	84
1964	335	176	-	1	512	57	36	57	-	150
1965	289	170	235	-	694	83	20	121	-	224
1966	447	107	172	-	726	58	14	94	-	166
1967	945	161	-	-	1106	196	29	-	-	225
1968	867	67	10	2	946	173	23	9	-	205
1969	815	51	4	-	870	180	19	2	-	201
1970	578	50	7	-	635	212	20	94	-	326
1971	425	67	53	-	545	208	10	-	-	218
1972	476	33	57	-	566	154	4	6	-	164
1973	273	6	60	-	339	121	1	17	-	139
1974	303	9	146	-	458	215	3	18	-	236
1975	262	30	4	-	296	174	35	-	4	213
1976	238	26	45	-	309	218	12	-	-	230
1977	414	35	-	-	449	289	13	-	-	302
1978	489	20	3	-	512	384	3	-	-	387
1979	818	10	-	-	828	289	2	-	-	291
1980	666	15	-	-	681	251	4	-	-	255
1981	437	77	-	-	514	225	2	-	-	227
1982	311	66	-	-	377	211	1	-	-	212
1983	480	104	-	-	584	320	1	-	-	321
1984	220	115	-	-	335	165	7	-	-	172
1985	282	35	-	-	317	73	-	-	-	73
1986	560	32	-	-	592	111	-	-	-	111
1987	251	11	-	-	262	109	-	-	-	109
1988	362	4	-	-	366	79	-	-	-	79
1989	480	1	-	-	481	50	-	-	-	50
1990	464	6	-	-	470	78	1	-	-	79
1991	980	4	-	4	988	144	-	-	-	144
1992	414	3	1	5	423	118	-	-	-	118
1993 ⁽¹⁾	9	-	-	-	9	54	-	-	-	54
1994 ⁽¹⁾	82	-	-	-	82	95	-	-	-	95
1995 ⁽¹⁾	27	-	-	-	27	133	-	-	-	133

⁽¹⁾ Foreign catch is provisional, from International Observer Program and NAFO Circular Letters.

Note: Data from 1991 onward, is from DFO Statistics Branch.

Table 3a. American Plaice reported landings for divisions 4VWX, includes 5Y.

Year	4V	4W	4X	Total
1970	5242	2481	635	8358
1971	7765	5991	545	14301
1972	6912	3175	566	10653
1973	8686	3407	339	12432
1974	11363	4951	458	16772
1975	7336	4115	296	11747
1976	8488	2350	309	11147
1977	6716	592	449	7757
1978	5501	743	512	6756
1979	5028	498	828	6354
1980	6293	598	681	7572
1981	5677	581	514	6772
1982	4920	400	377	5697
1983	5095	428	584	6107
1984	5509	284	335	6128
1985	3915	205	317	4437
1986	2792	298	592	3682
1987	4224	399	262	4885
1988	2758	329	366	3453
1989	2966	399	481	3846
1990	1679	240	470	2389
1991	186	192	988	1366
1992	447	131	423	1001
1993 ⁽¹⁾	39	84	9	132
1994 ⁽¹⁾	96	9	82	187
1995 ⁽¹⁾	359	0	27	386

Table 3b. Witch Flounder reported landings for divisions 4VWX, includes 5Y.

Year	4V	4W	4X	Total
1970	3282	1959	807	6048
1971	5640	11083	1141	17864
1972	4894	5759	698	11351
1973	6572	6862	535	13969
1974	4913	2004	498	7415
1975	3284	5307	331	8922
1976	2718	2683	341	5742
1977	1555	455	421	2431
1978	1540	563	188	2291
1979	1572	209	290	2071
1980	1801	189	331	2321
1981	1123	156	462	1741
1982	789	101	583	1473
1983	878	126	659	1663
1984	1191	149	593	1933
1985	1633	113	525	2271
1986	2221	162	631	3014
1987	2554	171	492	3217
1988	2185	221	541	2947
1989	1610	155	527	2292
1990	1158	146	645	1949
1991	1288	38	605	1931
1992	941	90	829	1860
1993 ⁽¹⁾	513	19	373	905
1994 ⁽¹⁾	271	4	391	666
1995 ⁽¹⁾	309	6	306	621

⁽¹⁾ Foreign catch is provisional, from International Observer Program and NAFO Circular Letters.

Note: Data from 1991 onward, is from DFO Statistics Branch.

Table 3c. Yellowtail Flounder reported landings for divisions 4VWX.

Year	4V	4W	4X	Total
1970	670	2686	326	3682
1971	889	668	218	1775
1972	697	624	164	1485
1973	980	394	139	1513
1974	573	130	236	939
1975	1103	254	213	1570
1976	473	201	230	904
1977	1101	40	302	1443
1978	1085	156	387	1628
1979	1655	144	291	2090
1980	2158	78	255	2491
1981	2539	123	227	2889
1982	2360	51	212	2623
1983	2043	59	321	2423
1984	2239	51	172	2462
1985	932	15	73	1020
1986	672	22	111	805
1987	947	94	109	1150
1988	942	47	79	1068
1989	1385	74	50	1509
1990	2815	116	79	3010
1991	1313	18	144	1475
1992	1357	16	118	1491
1993 ⁽¹⁾	1641	6	54	1701
1994 ⁽¹⁾	1031	4	95	1130
1995 ⁽¹⁾	732	3	133	868

Table 3d. Winter Flounder reported landings for divisions 4VWX.

Year	4V	4W	4X	Total
1970	8	44	1478	1530
1971	237	1364	1483	3084
1972	78	551	825	1454
1973	480	655	774	1909
1974	777	1005	974	2756
1975	179	525	670	1374
1976	235	345	717	1297
1977	226	9	1022	1257
1978	186	137	884	1207
1979	228	13	847	1088
1980	30	10	1134	1174
1981	26	11	1411	1448
1982	82	10	1144	1236
1983	72	8	915	995
1984	2	5	877	884
1985	27	2	795	824
1986	2	4	1034	1040
1987	9	3	1044	1056
1988	97	15	1460	1572
1989	147	40	1289	1476
1990	70	8	1886	1964
1991	28	16	602	646
1992	2	3	564	569
1993 ⁽¹⁾	0	2	343	345
1994 ⁽¹⁾	0	2	520	522
1995 ⁽¹⁾	0	0	922	922

⁽¹⁾ Foreign catch is provisional, from International Observer Program and NAFO Circular Letters.

Note: Data from 1991 onward, is from DFO Statistics Branch.

Table 3e. Unspecified* Flounder reported landings for divisions 4VWX.

Year	4V	4W	4X	Total
1970	7	2	2	11
1971	-	-	1	1
1972	42	1	681	724
1973	64	112	806	982
1974	99	2	716	817
1975	5	283	834	1122
1976	61	486	496	1043
1977	27	19	898	944
1978	5	28	1027	1060
1979	40	51	1212	1303
1980	23	6	1858	1887
1981	17	4	1556	1577
1982	4	7	1763	1774
1983	30	20	2023	2073
1984	6	2	1995	2003
1985	3	7	2200	2210
1986	46	22	3234	3302
1987	33	9	2380	2422
1988	70	19	2205	2294
1989	15	78	976	1069
1990	10	22	3012	3044
1991	1275	206	3445	4926
1992	1798	85	3558	5841
1993 ⁽¹⁾	1618	37	3232	4887
1994 ⁽¹⁾	1400	8	2189	3597
1995 ⁽¹⁾	909	6	1144	2059

* Any mixture of winter, witch, yellowtail and American plaice.

⁽¹⁾ Foreign catch is provisional, from International Observer Program and NAFO Circular Letters.

Note: Data from 1991 onward, is from DFO Statistics Branch.

Table 4. Reported landings by quarter of year for Div. 4X.

Year	Winter Flounder					Witch Flounder					American Plaice					Yellowtail Flounder				
	1st Quart.	2nd Quart.	3rd Quart.	4th Quart.	Total	1st Quart.	2nd Quart.	3rd Quart.	4th Quart.	Total	1st Quart.	2nd Quart.	3rd Quart.	4th Quart.	Total	1st Quart.	2nd Quart.	3rd Quart.	4th Quart.	Total
1970	51	660	513	246	1470	119	371	122	148	760	101	192	111	174	578	28	89	44	51	212
1971	13	712	511	182	1418	148	283	251	93	775	61	175	81	108	425	20	77	74	37	208
1972	0	272	421	99	792	52	263	209	39	563	84	170	131	91	476	12	58	71	13	154
1973	1	304	266	62	633	113	150	98	22	383	67	71	64	71	273	30	29	53	9	121
1974	1	273	337	140	751	27	171	140	35	373	10	76	76	141	303	12	58	107	38	215
1975	6	243	274	92	615	33	130	55	63	281	5	55	115	87	262	14	41	93	26	174
1976	11	255	340	90	696	60	84	104	37	285	48	62	44	84	238	15	76	107	20	218
1977	16	392	436	165	1009	140	108	69	85	402	85	137	120	72	414	37	114	111	27	289
1978	9	272	411	187	879	57	61	21	33	172	48	84	260	97	489	30	170	135	49	384
1979	18	163	516	147	844	61	94	47	81	283	46	354	308	110	818	22	118	102	47	289
1980	25	449	489	170	1133	88	71	83	78	320	52	213	315	86	666	37	112	78	24	251
1981	8	426	754	223	1411	71	83	140	127	421	72	173	164	28	437	18	73	108	26	225
1982	78	367	575	119	1139	57	154	147	169	527	34	96	123	58	311	36	54	77	44	211
1983	37	282	482	111	912	86	164	166	66	482	89	204	141	46	480	50	106	118	46	320
1984	72	322	401	75	870	64	141	180	46	431	42	66	86	26	220	38	61	52	14	165
1985	25	290	421	58	794	95	131	150	76	452	64	96	78	44	282	27	24	20	2	73
1986	52	252	623	104	1031	106	105	214	128	553	49	183	248	80	560	23	31	24	33	111
1987	15	404	521	84	1024	134	129	116	93	472	65	110	58	18	251	22	42	33	12	109
1988	67	401	770	221	1459	142	126	132	129	529	60	117	142	43	362	21	21	28	9	79
1989	191	497	456	145	1289	246	209	40	29	524	181	237	54	8	480	5	34	6	5	50
1990	406	496	572	411	1885	181	128	241	88	638	134	158	143	29	464	12	11	34	21	78
1991	76	85	158	283	602	292	126	66	118	602	3	166	411	400	980	4	33	51	56	144
1992	114	157	159	134	564	360	206	115	147	828	58	185	87	84	414	7	45	39	27	118
1993 ⁽¹⁾	26	117	145	55	343	189	110	42	32	373	-	-	9	16	9	6	18	19	10	53
1994 ⁽¹⁾	19	115	118	269	521	144	110	48	88	390	4	16	46	-	82	3	26	27	40	96
1995 ⁽¹⁾	-	-	-	-	-	185	58	36	27	306	1	14	10	2	27	14	44	51	24	133

⁽¹⁾ Foreign catch is provisional, from International Observer Program and NAFO Circular Letters.

Note: Data from 1991 onward, is from DFO Statistics Branch.

Table 5a. Nominal flatfish landings for mobile gear in division 4X for Canada (Maritimes, Quebec and Newfoundland).

Year	OTB TC 0 - 3						OTB TC 4+						Scottish & Danish Seine ⁽²⁾					
	Place	Witch Flounder	Yellow Tail	Winter Flounder	Unspec. Flounder	Total	Place	Witch Flounder	Yellow Tail	Winter Flounder	Unspec. Flounder	Total	Place	Witch Flounder	Yellow Tail	Winter Flounder	Unspec. Flounder	Total
1970	356	314	122	1406	-	2198	187	103	60	27	-	377	4	320	19	-	-	343
1971	203	274	94	1309	-	1880	173	185	87	15	-	460	8	304	19	1	-	332
1972	195	46	48	722	677	1688	225	99	47	4	4	379	1	405	51	-	-	457
1973	129	40	36	562	795	1562	94	80	18	-	9	201	-	263	50	1	-	314
1974	158	42	115	699	699	1713	73	43	28	7	5	156	1	278	39	1	-	319
1975	130	52	86	550	812	1630	86	55	15	9	15	180	-	152	25	4	3	184
1976	83	61	145	641	463	1393	112	55	11	2	5	185	3	168	38	13	5	227
1977	214	94	127	850	878	2163	135	101	49	18	-	303	14	198	25	2	17	256
1978	247	47	187	762	1014	2257	82	48	73	27	-	230	42	73	8	-	7	130
1979	559	52	208	718	1181	2718	106	110	4	4	16	240	18	117	34	9	2	180
1980	458	183	184	924	1804	3553	96	94	11	26	3	230	2	37	18	1	-	58
1981	317	277	155	1287	1547	3583	28	28	-	5	-	61	2	70	21	-	-	93
1982	225	301	180	1035	1697	3438	18	49	11	11	1	90	6	88	11	2	2	109
1983	304	248	207	802	1979	3540	28	52	2	6	19	107	9	122	22	-	3	156
1984	181	307	126	724	1939	3277	4	3	-	-	8	15	-	102	14	-	-	116
1985	244	247	36	696	2190	3413	9	10	2	2	8	31	2	168	26	7	-	203
1986	482	349	66	935	3223	5055	1	6	-	-	-	7	5	173	21	-	-	199
1987	207	310	47	879	2374	3817	5	5	3	-	-	13	6	135	36	-	-	177
1988	321	381	63	1341	2188	4294	1	7	1	-	-	9	1	122	13	4	-	140
1989	443	397	29	1185	953	3007	2	8	0	4	-	14	5	104	13	9	-	131
1990	410	545	70	1710	3006	5741	15	0	0	2	-	17	1	51	2	2	-	56
1991 ⁽¹⁾	967	398	130	593	3278	5366	4	14	1	3	23	45	1	182	5	1	14	203
1992 ⁽¹⁾	411	676	107	556	3645	5395	2	9	1	5	11	28	0	141	1	0	12	154
1993 ⁽¹⁾	-	248	38	283	3130	3699	9	2	-	2	4	17	-	122	4	1	5	132
1994 ⁽¹⁾	71	287	74	497	2018	2947	1	4	-	1	6	12	-	90	-	-	15	105
1995 ⁽¹⁾	25	255	115	898	1120	2413	0	2	0	1	11	14	-	47	2	9	1	59

⁽¹⁾ Data from DFO Statistics Branch.⁽²⁾ All tonnage classes combined.

5b. Nominal flatfish landings for fixed gear in division 4X for Canada (Maritimes, Quebec and Newfoundland).

4X												
Year	LL, LHP ⁽²⁾						GN AND OTHER ⁽²⁾					
	Place	Witch Flounder	Yellow Tail	Winter Flounder	Unspec. Flounder	Total	Place	Witch Flounder	Yellow Tail	Winter Flounder	Unspec. Flounder	Total
1970	27	-	9	23	-	59	4	23	2	14	-	43
1971	32	10	8	33	-	83	9	2	-	60	-	71
1972	26	-	6	39	-	71	29	13	2	27	-	71
1973	33	-	16	37	-	86	17	-	1	33	-	51
1974	63	1	30	1	-	95	8	9	3	43	-	63
1975	41	22	48	12	1	124	5	-	-	40	3	48
1976	32	-	24	23	21	100	8	1	-	17	2	28
1977	22	8	13	40	2	85	29	1	75	99	1	205
1978	51	3	11	37	4	106	67	1	105	53	-	226
1979	74	2	37	40	13	166	61	2	6	73	-	142
1980	38	4	11	46	44	143	72	2	27	136	7	244
1981	75	16	4	57	8	160	15	30	45	62	1	153
1982	41	51	9	33	2	136	21	38	-	58	61	178
1983	69	15	22	16	-	122	70	45	67	88	20	290
1984	24	2	11	40	1	78	11	17	14	106	45	193
1985	20	9	3	13	1	46	7	18	6	76	1	108
1986	44	10	11	4	2	71	28	15	13	92	-	148
1987	13	22	23	68	-	126	20	-	-	77	1	98
1988	24	5	2	16	-	47	15	14	-	98	17	144
1989	9	0	2	31	6	48	19	12	5	57	17	110
1990	11	0	1	40	-	52	27	42	5	131	6	211
1991 ⁽¹⁾	7	0	2	0	4	13	0	8	5	4	123	140
1992 ⁽¹⁾	0	0	9	-	144	153	2	2	1	3	147	155
1993 ⁽¹⁾	-	-	10	49	16	75	-	1	1	8	78	88
1994 ⁽¹⁾	-	2	16	1	114	133	9	8	6	22	36	81
1995 ⁽¹⁾	0	6	16	-	1	17	1	3	1	15	15	35

⁽¹⁾ Data from DFO Statistics Branch.

⁽²⁾ All tonnage classes combined.

Table 6. Management table for 4X flatfish 1995.

Year	Fleet	Allocation	Reported catch	% Taken
1995	Fixed < 65'	75	26	35
	Generalist < 45' (April 1 - Dec. 31)	337	335	99
	Mobile <65' ITQ (April 1 - Dec. 31)	2373	2082	88
	Mobile 65-100'	15	14	93
	Vessels > 100'	575	38	7

Table 7. Mean numbers/tow, mean weights/tow and standard errors for 4X flatfish for 1970 - 1995 (Summer Survey).

Year	Mean Numbers per Tow and Standard Errors						Mean Weights per Tow and Standard Errors					
	Winter Flounder		Winch Flounder		Plaice		Yellowtail Flounder		Winch Flounder		Plaice	
	Mean #/Tow	Standard Error	Mean #/Tow	Standard Error	Mean #/Tow	Standard Error	Mean #/Tow	Standard Error	Mean Wts/Tow	Standard Error	Mean Wts/Tow	Standard Error
1970	0.31	(0.09)	2.10	(0.75)	13.07	(10.68)	0.40	(0.20)	1.42	(0.63)	3.74	(2.80)
1971	0.29	(0.16)	0.92	(0.41)	6.44	(2.72)	0.56	(0.29)	0.59	(0.28)	1.85	(0.88)
1972	0.24	(0.04)	3.20	(0.86)	5.66	(1.94)	1.64	(0.95)	2.25	(0.66)	1.66	(0.64)
1973	0.54	(0.24)	4.88	(1.52)	5.02	(1.28)	0.26	(0.07)	3.29	(0.83)	2.07	(0.67)
1974	1.04	(0.67)	3.42	(1.13)	13.47	(3.19)	0.35	(0.18)	2.36	(0.67)	3.76	(0.89)
1975	0.60	(0.14)	1.97	(0.33)	4.51	(1.00)	0.43	(0.11)	1.83	(0.31)	1.45	(0.28)
1976	0.68	(0.19)	1.14	(0.28)	1.80	(0.39)	1.54	(1.32)	0.71	(0.21)	0.54	(0.13)
1977	1.34	(0.54)	4.47	(2.45)	1.94	(0.49)	0.45	(0.09)	3.37	(1.57)	0.75	(0.21)
1978	0.32	(0.15)	2.37	(0.56)	5.21	(0.85)	0.44	(0.19)	1.96	(0.51)	1.27	(0.33)
1979	3.91	(2.15)	0.94	(0.31)	3.72	(0.90)	2.05	(0.69)	0.70	(0.19)	1.37	(0.46)
1980	2.06	(0.79)	1.40	(0.25)	6.13	(1.70)	1.74	(1.10)	1.23	(0.24)	2.79	(0.85)
1981	3.35	(1.12)	3.60	(1.32)	4.46	(1.13)	1.48	(0.73)	2.25	(0.61)	1.42	(0.47)
1982	4.32	(2.07)	3.63	(1.48)	8.15	(2.31)	1.61	(0.56)	1.88	(0.50)	2.37	(0.69)
1983	2.69	(1.93)	2.28	(0.70)	6.01	(0.81)	0.15	(0.07)	1.77	(0.76)	1.87	(0.38)
1984	4.01	(1.34)	4.87	(1.20)	8.57	(2.27)	0.93	(0.28)	2.77	(0.84)	2.62	(0.77)
1985	1.88	(0.49)	1.40	(0.35)	4.62	(1.55)	0.27	(0.17)	0.93	(0.27)	1.08	(0.40)
1986	3.42	(1.03)	2.55	(0.83)	7.63	(2.72)	1.32	(0.54)	1.44	(0.37)	1.35	(0.53)
1987	5.60	(1.48)	1.10	(0.23)	7.67	(1.55)	0.67	(0.35)	0.74	(0.15)	1.69	(0.37)
1988	7.08	(2.05)	1.60	(0.56)	11.31	(4.07)	2.77	(1.61)	0.93	(0.35)	1.89	(0.62)
1989	6.57	(1.47)	1.70	(0.57)	8.37	(1.81)	1.28	(0.75)	1.06	(0.33)	1.39	(0.33)
1990	8.98	(4.76)	0.77	(0.30)	2.87	(0.73)	0.66	(0.21)	0.39	(0.15)	0.76	(0.19)
1991	6.07	(1.63)	1.94	(1.01)	8.08	(3.59)	2.16	(1.08)	0.79	(0.25)	1.22	(0.47)
1992	10.29	(2.15)	0.61	(0.20)	9.33	(3.29)	1.77	(0.72)	0.30	(0.14)	2.17	(0.76)
1993	5.44	(1.67)	1.47	(0.39)	5.26	(1.45)	1.85	(0.63)	0.70	(0.31)	0.86	(0.31)
1994	5.44	(1.99)	2.13	(0.73)	14.35	(3.62)	4.66	(1.44)	0.61	(0.23)	1.94	(0.45)
1995	6.38	(1.49)	1.59	(0.45)	10.14	(2.20)	2.02	(0.53)	0.45	(0.17)	1.71	(0.34)

Table 8. Minimum Biomass (t) estimates for Southwest Nova Scotia (4X).

	Plaice	Yellowtail	Witch	Winter
1970	5889	228	2354	328
1971	2916	240	877	202
1972	2615	493	3545	170
1973	3249	103	5176	415
1974	5918	219	3720	747
1975	2273	298	2876	620
1976	857	686	1090	666
1977	1177	700	5306	2106
1978	1996	278	2991	355
1979	1856	786	1452	3677
1980	4394	1556	1927	2020
1981	2231	1330	3532	3404
1982	3735	668	2959	4103
1983	2935	108	2779	1491
1984	4082	296	4316	3453
1985	1695	251	1459	1195
1986	2118	602	2262	2813
1987	2659	262	1161	2750
1988	2973	1400	1460	5560
1989	2191	460	1660	4560
1990	1192	307	606	6935
1991	1924	836	1236	4857
1992	3417	752	467	6512
1993	1359	726	1093	3211
1994	3043	1477	967	3093
1995	2687	761	706	4395

Table 9. Flatfish individual and combined CPUE for OTBs and DS TC 1-3 where one or any flatfish species was main species.

	Plaice	Yellowtail	Witch Flounder	Winter Flounder	Unspecified	Any Flatfish (MS)
4X						
1989	.156		.086	.008	.137	.131
1990	.087	.055	.093	.120	.112	.113
1991	.092	.065	.102	.101	.083	.088
1992	.067	.059	.085	.077	.071	.073
1993	-	.041	.064	.066	.060	.061
1994	.056	.041	.063	.065	.055	.059
1995	.035	.037	.045	.079	.053	.060

Table 10. Mobile gear commercial samples for 4X.

4X				
	Winter	Witch	Yellowtail	Plaice
1990	2	-	-	-
1991	3	5	-	-
1992	4	3	-	-
1993	9	2	-	1
1994	1	8	-	2
1995	8	4	-	1

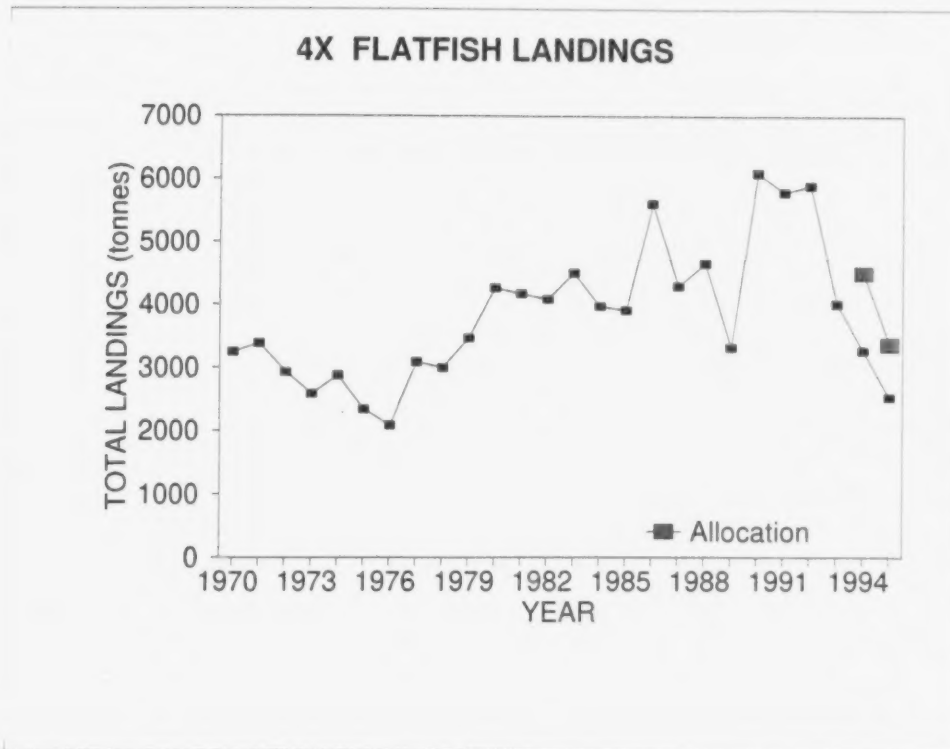


Fig. 1.

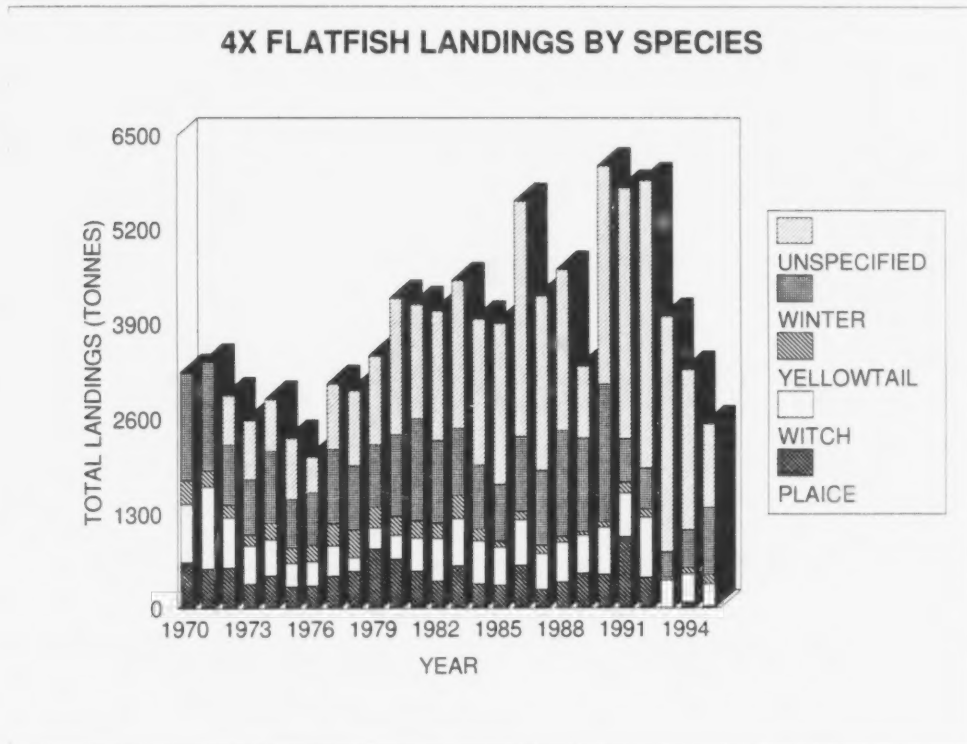


Fig. 2.

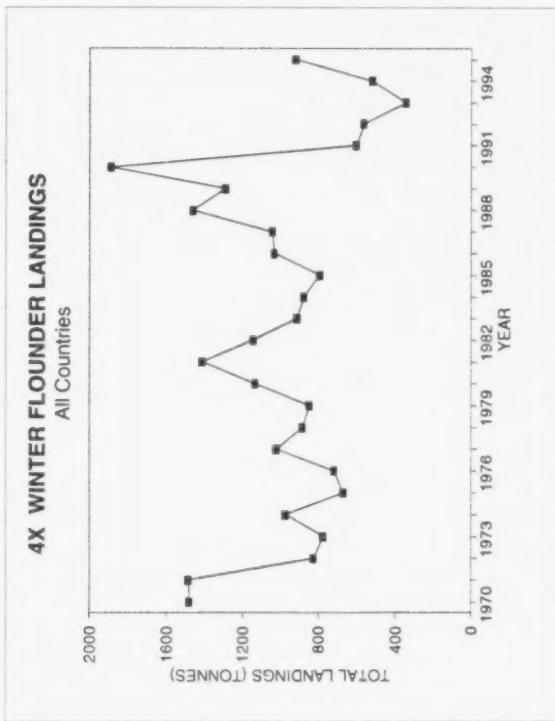


Fig. 3.

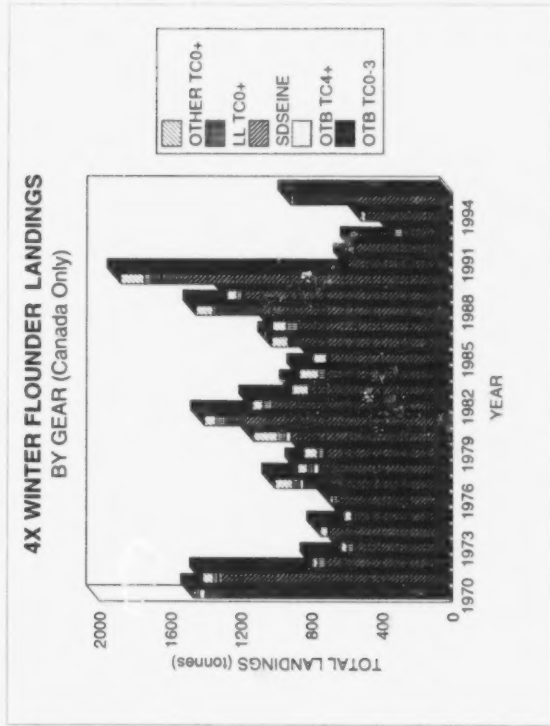


Fig. 4.

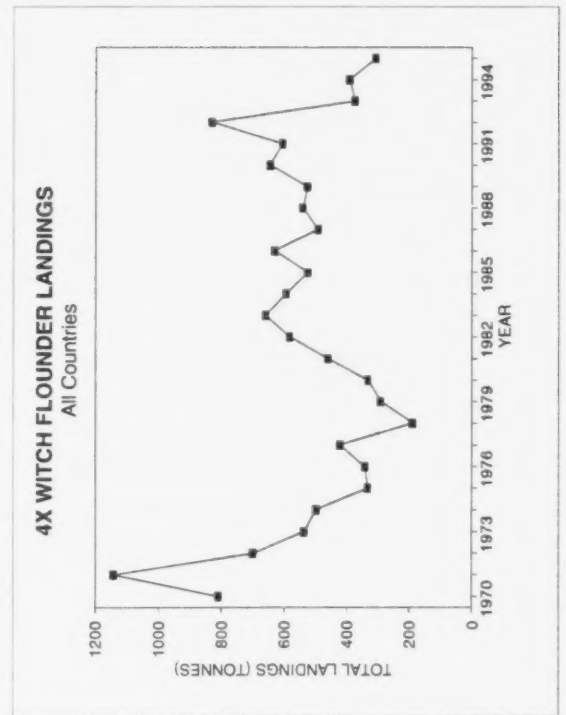


Fig. 5.

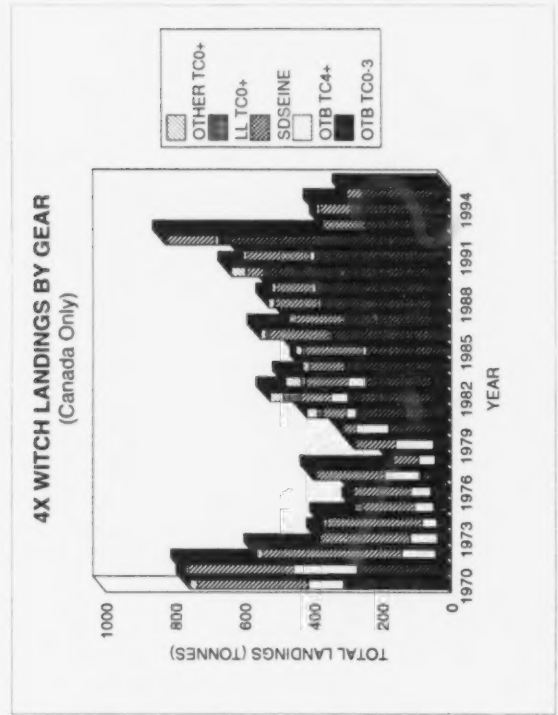


Fig. 6.

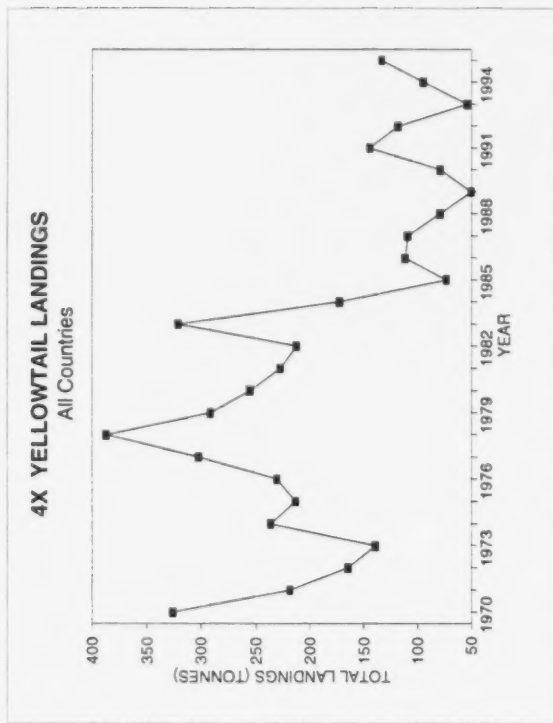


Fig. 7.

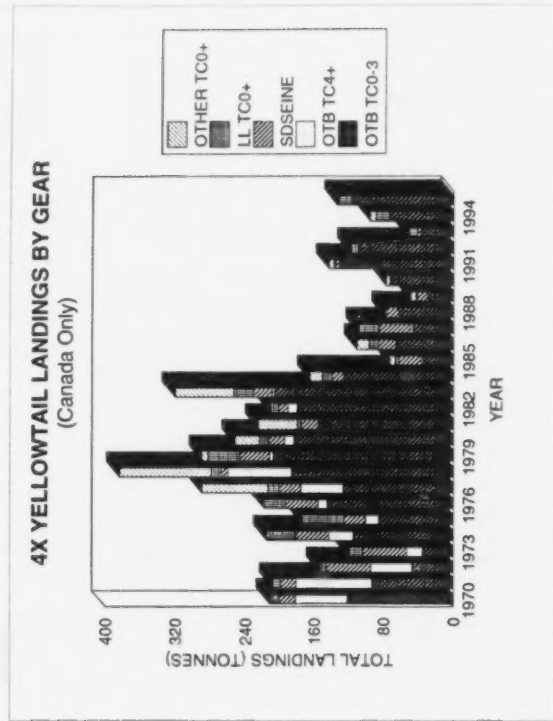


Fig. 8.

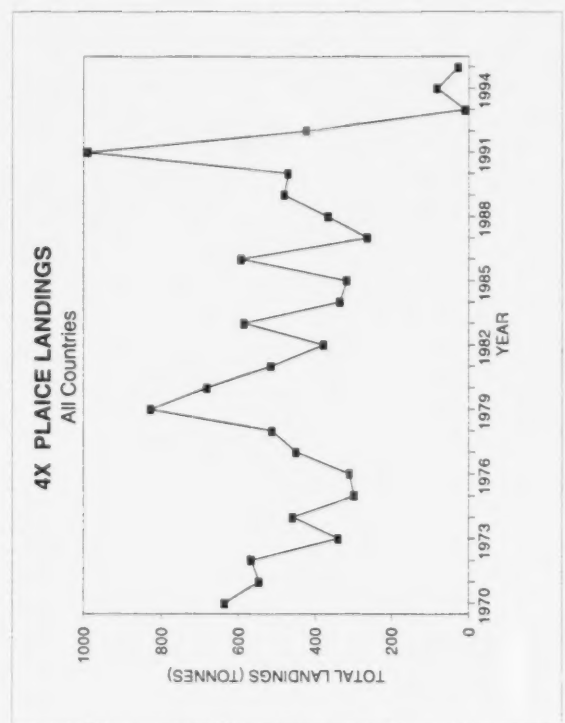


Fig. 9.

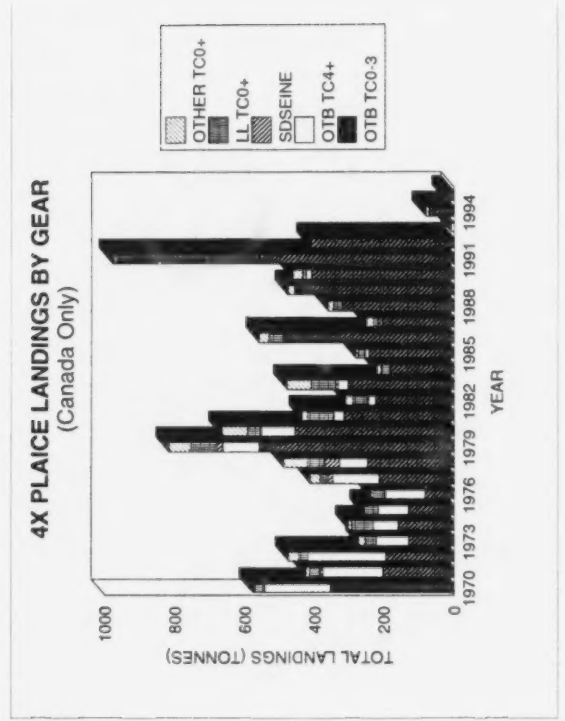


Fig. 10.

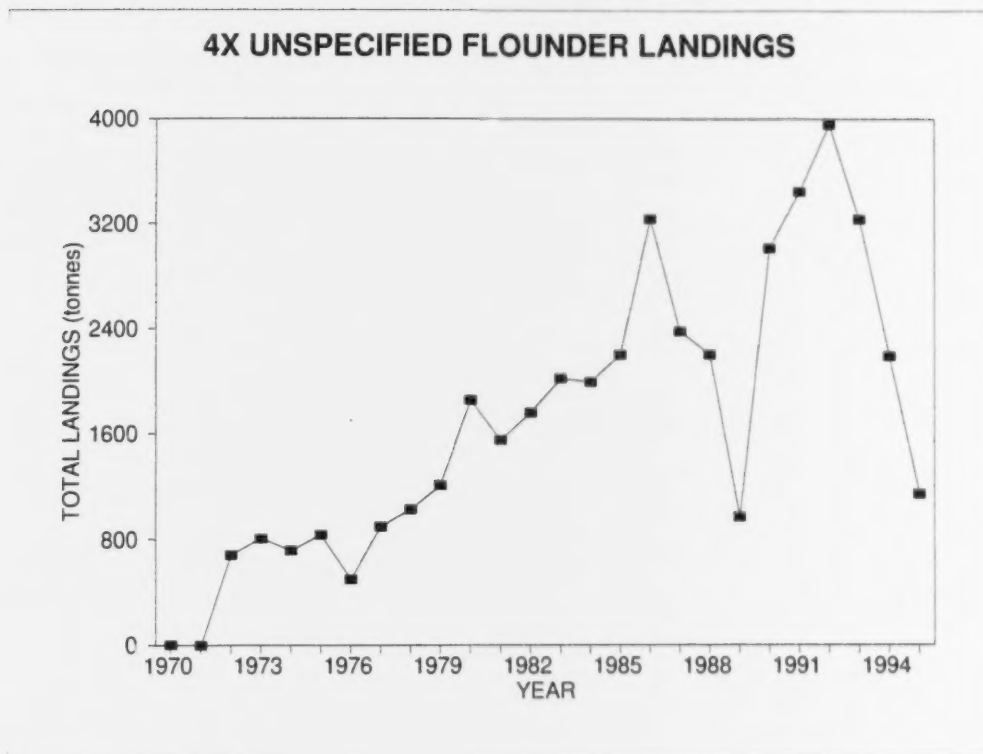


Fig. 11.

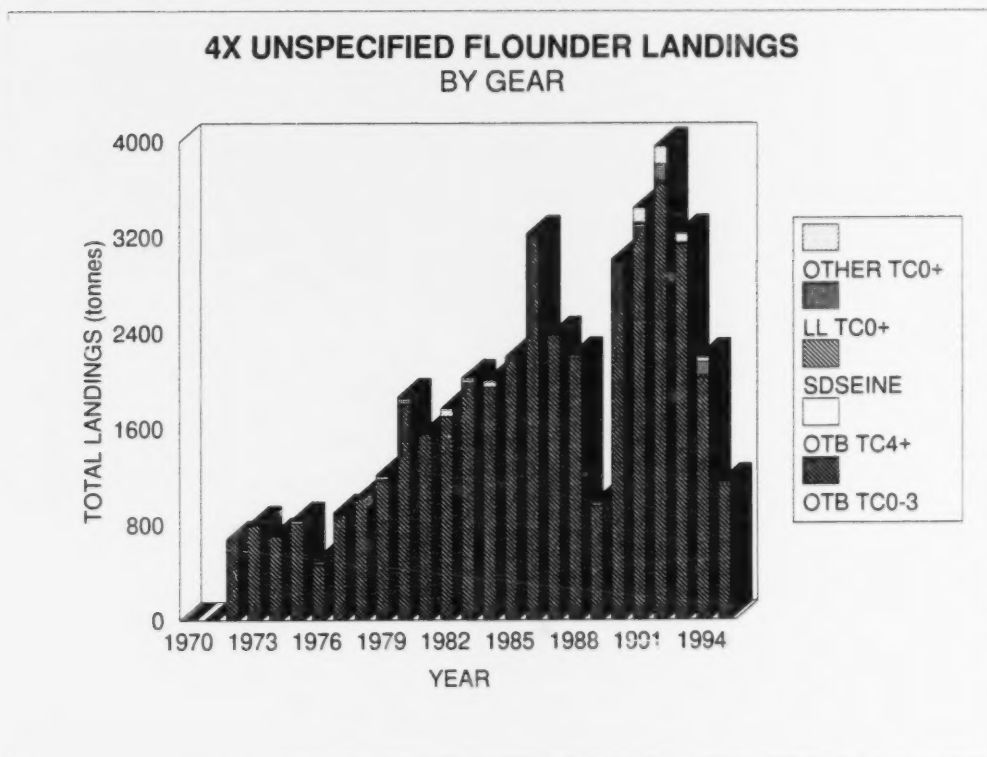


Fig. 12.

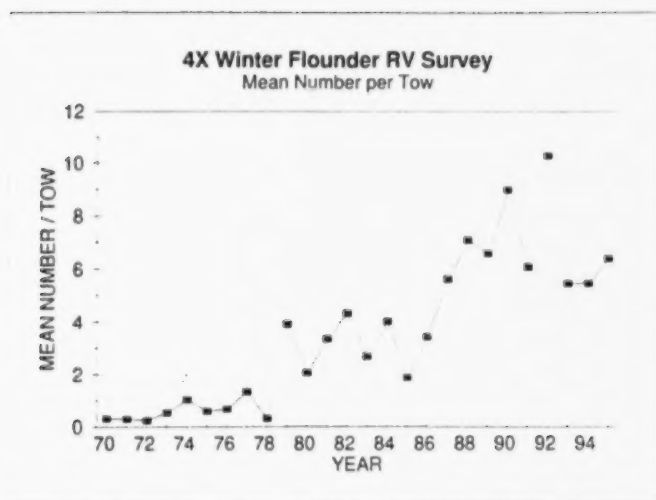


Fig. 13.

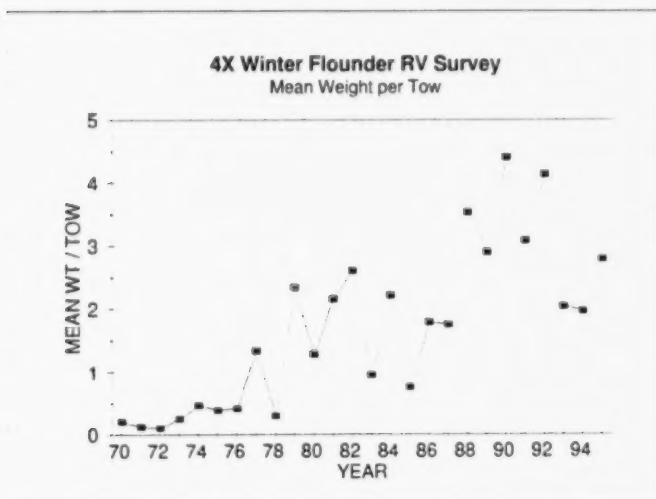


Fig. 14.

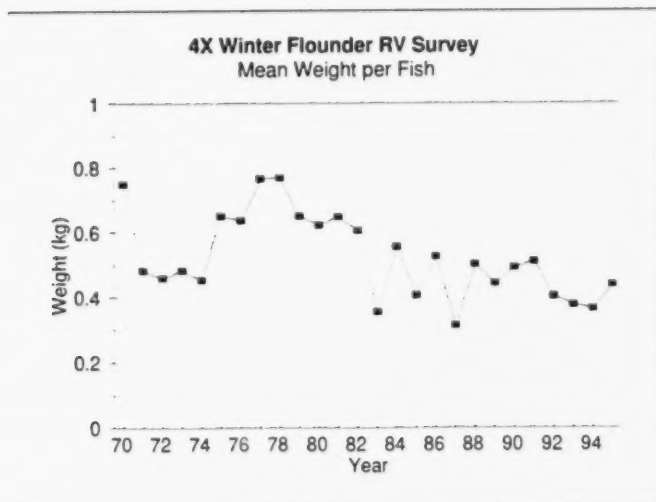
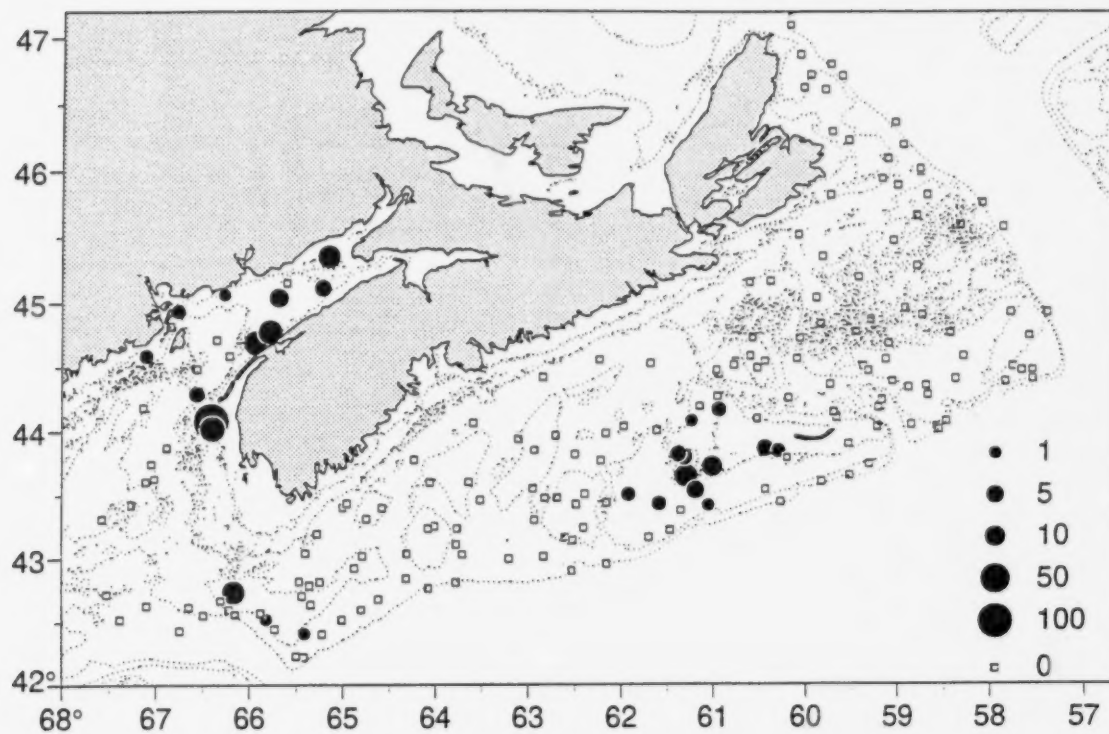
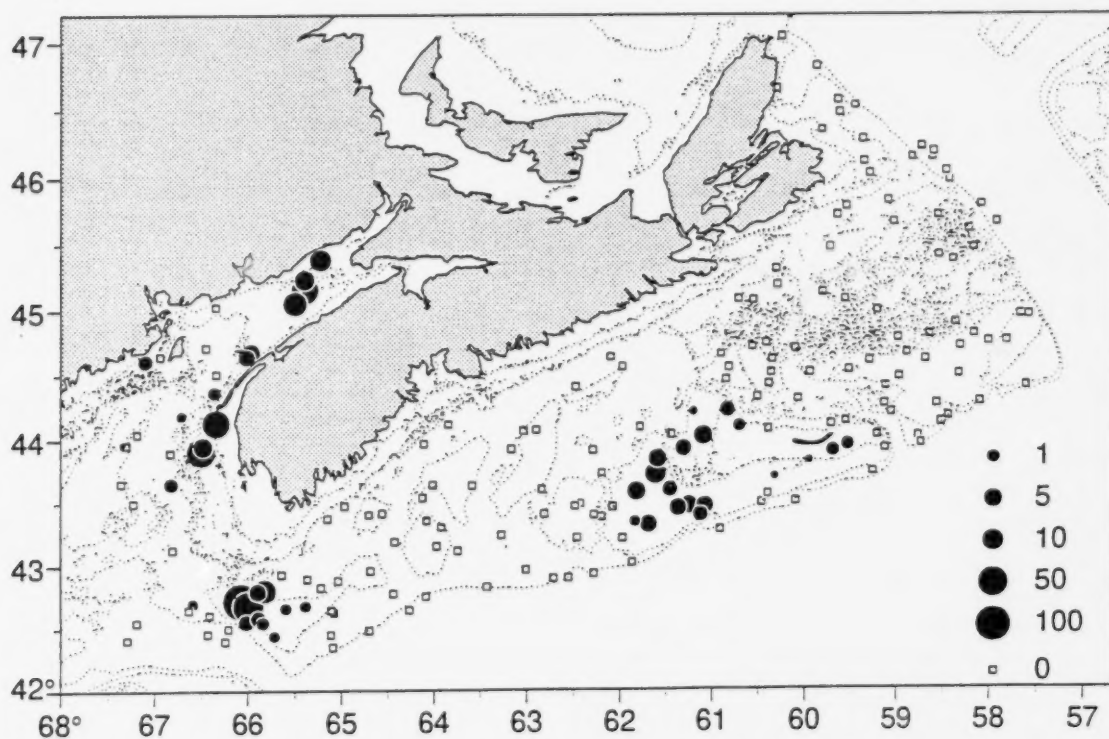


Fig. 15.



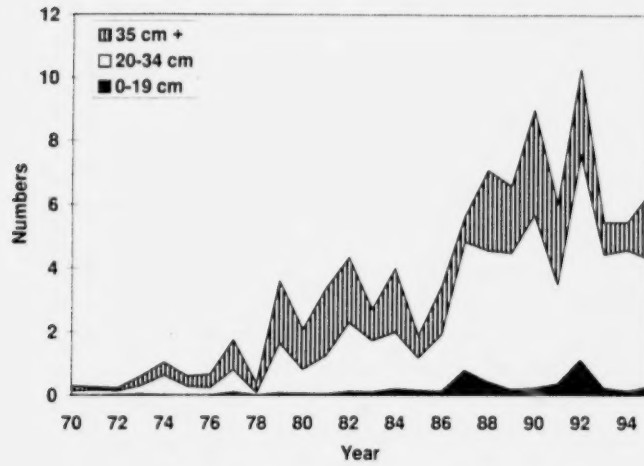
Summer Groundfish Survey 4VWX Winter Flounder Biomass (kg/tow) July 1994



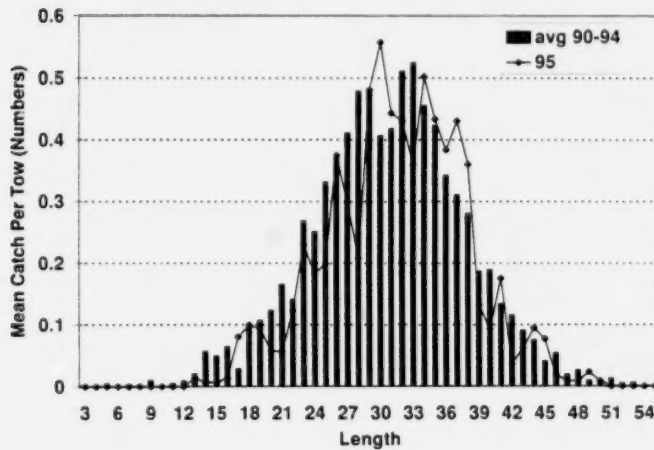
Summer Groundfish Survey 4VWX Winter Flounder Biomass (kg/tow) July 1995

Fig. 16.

4X Winter Flounder Summer Survey Mean Nos Per Tow



4X Winter Flounder Survey Length Frequencies



4X Winter Flounder Survey Length Frequencies (%)

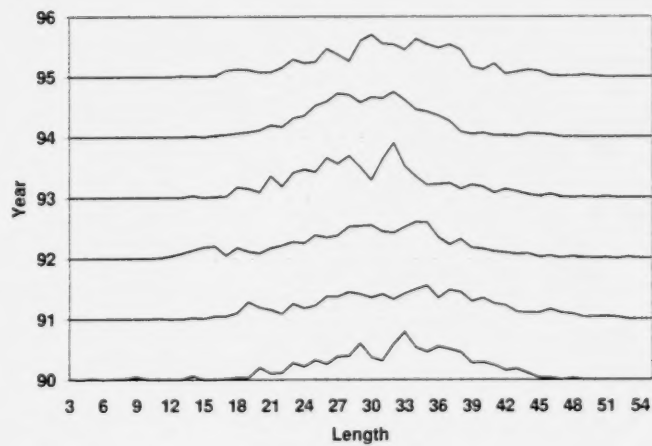


Fig. 17.

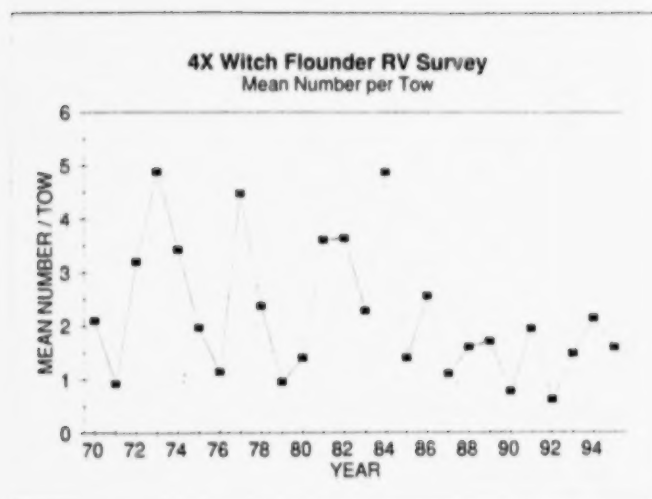


Fig. 18.

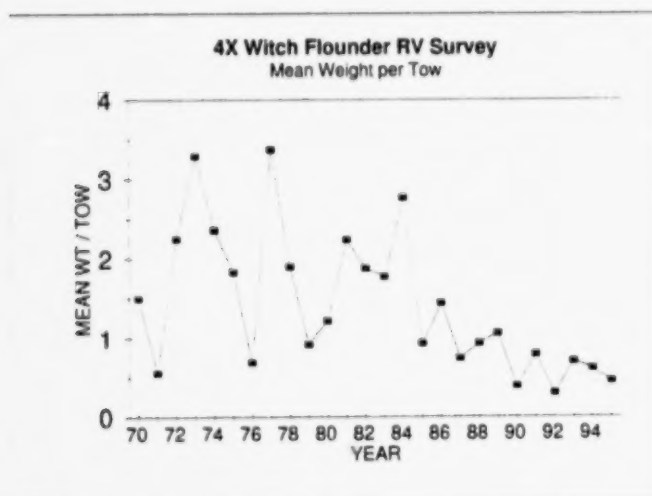


Fig. 19.

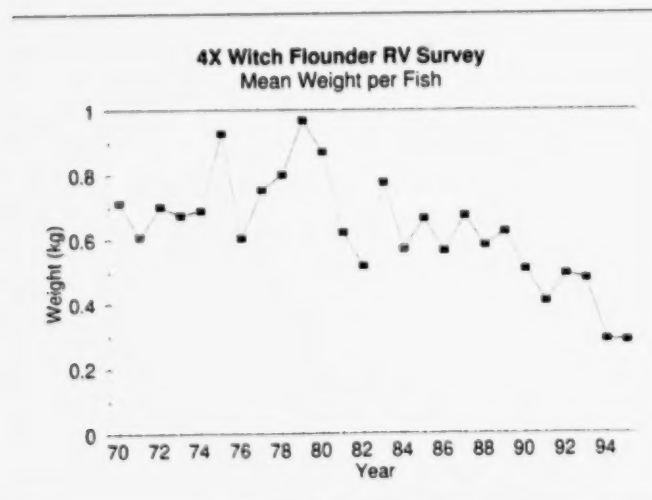


Fig. 20.

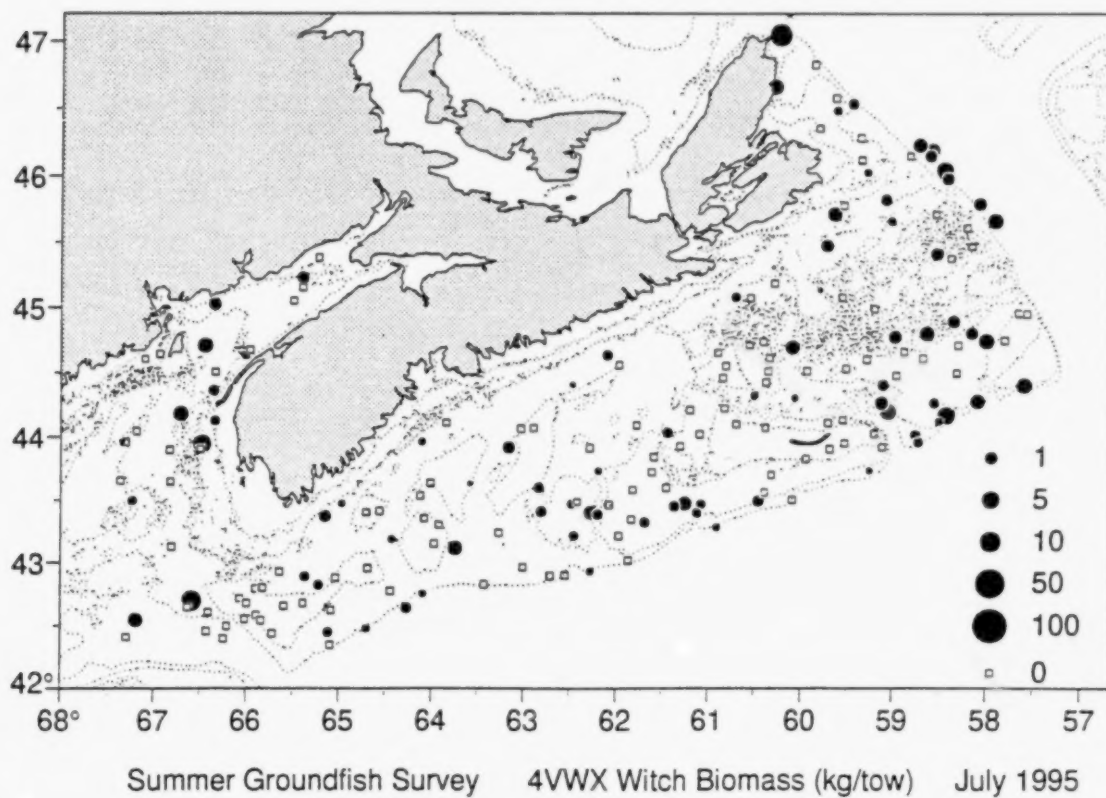
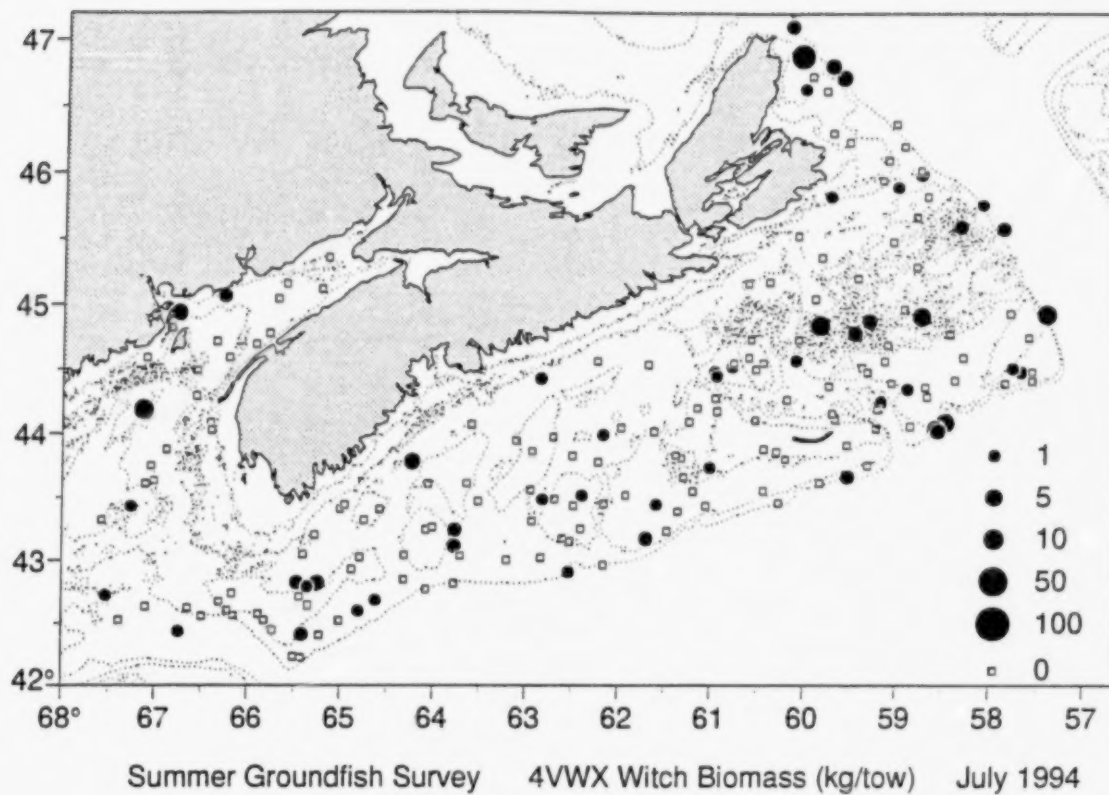
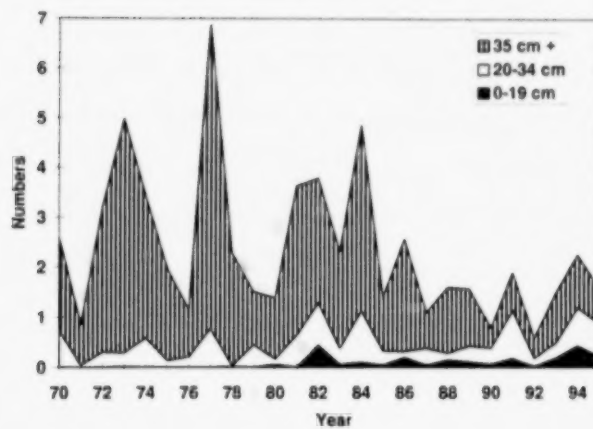
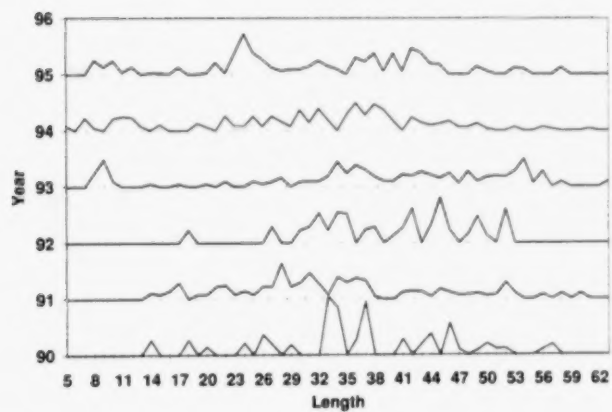


Fig. 21.

4X Witch Summer Survey Mean Nos Per Tow



4X Witch Survey Length Frequencies (%)



4X Witch Survey Length Frequencies

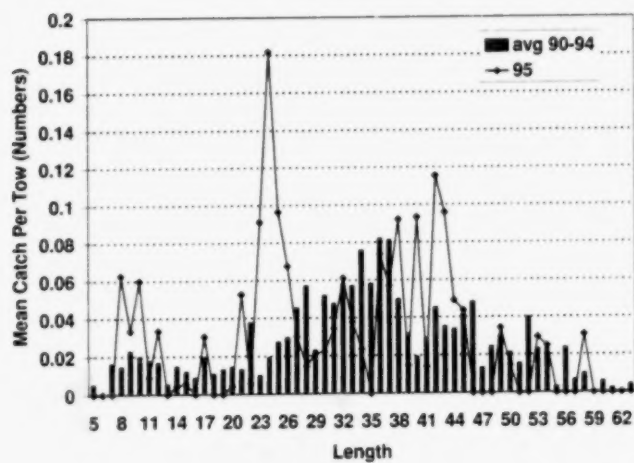


Fig. 22.

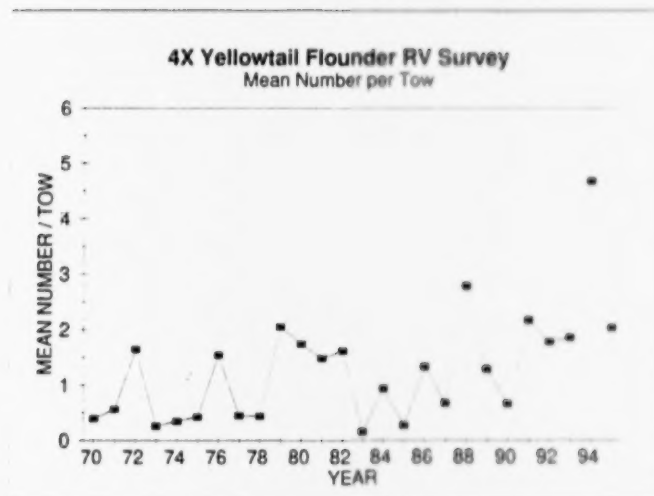


Fig. 23.

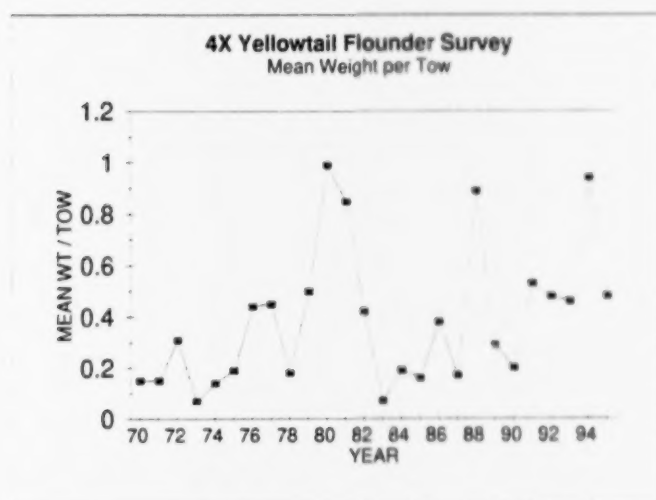


Fig. 24.

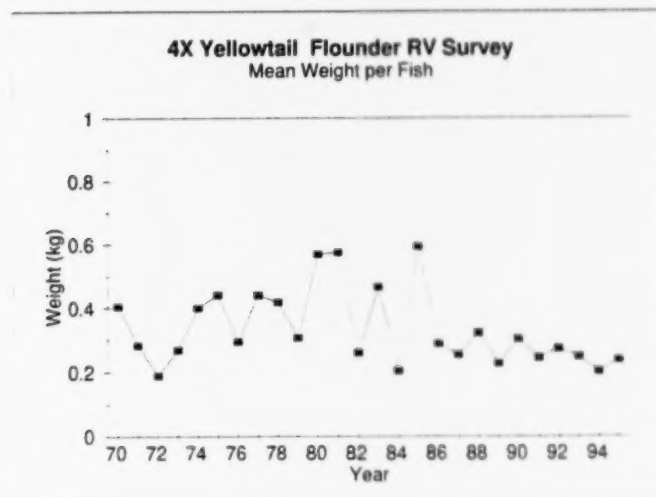
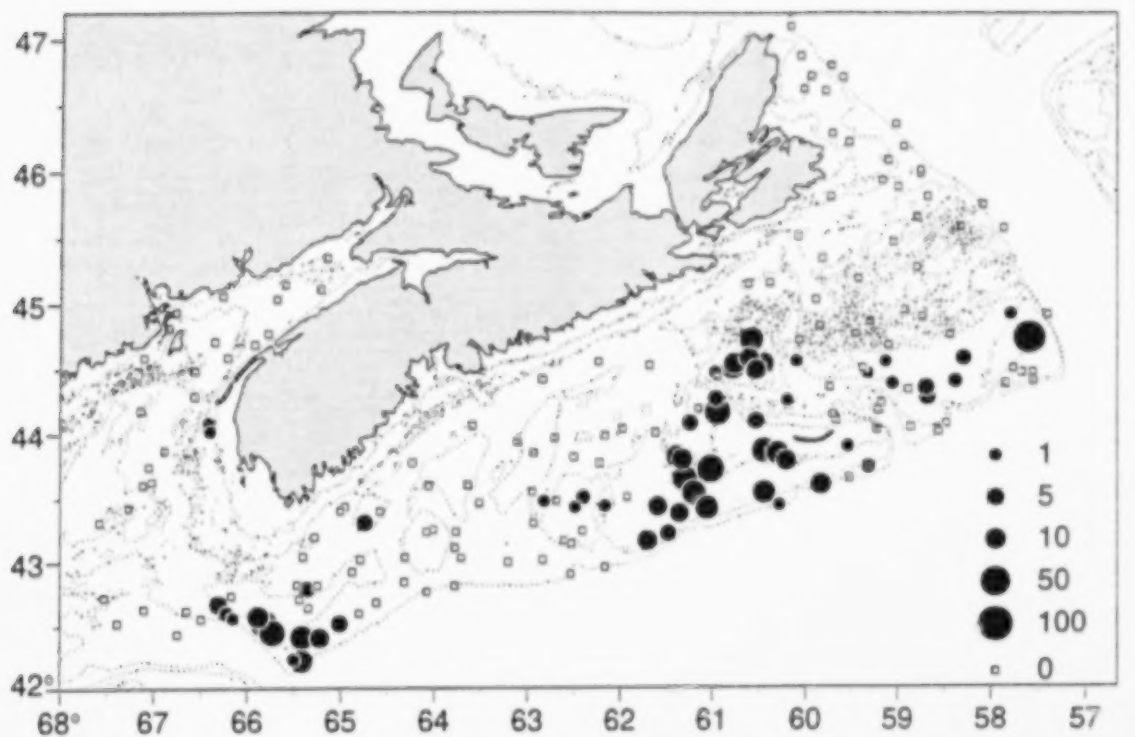
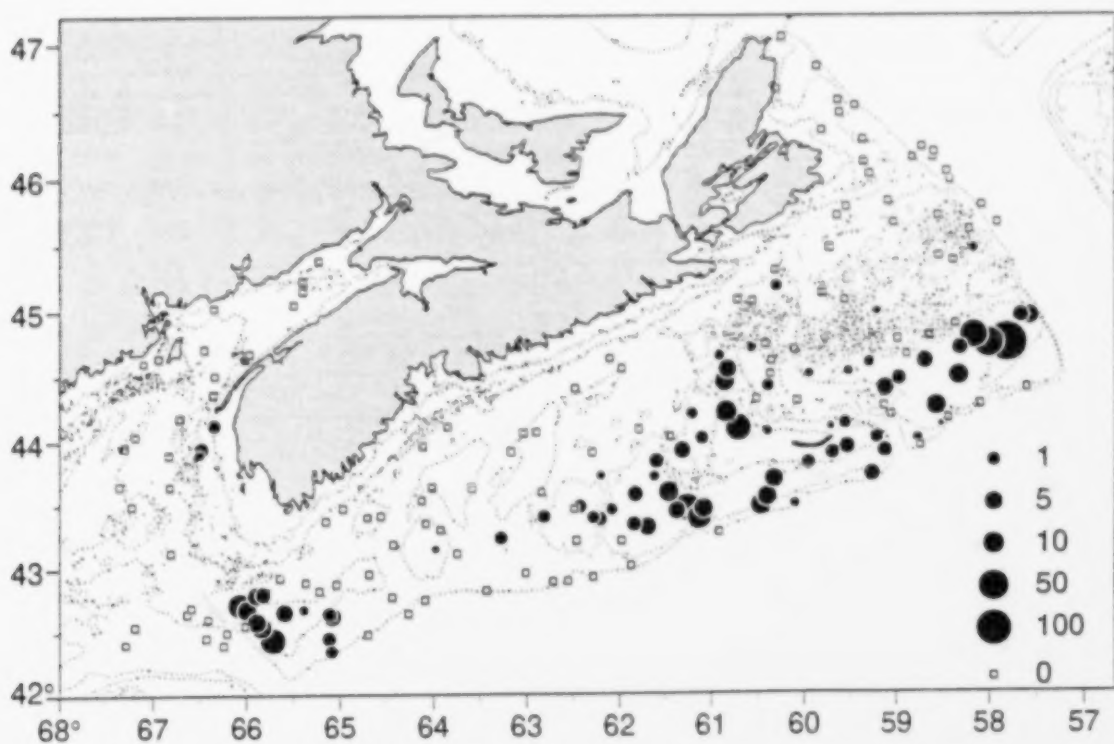


Fig. 25.



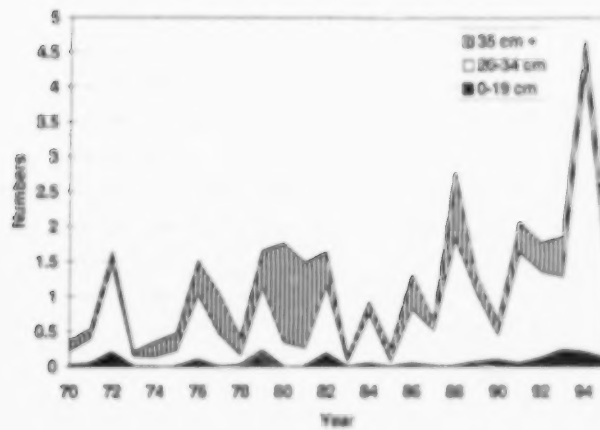
Summer Groundfish Survey 4VWX Yellowtail Biomass (kg/tow) July 1994



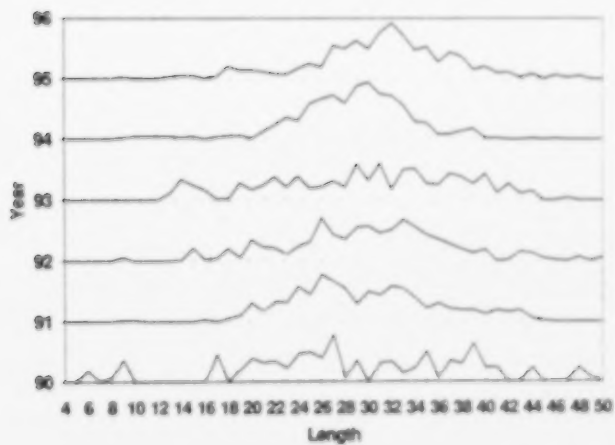
Summer Groundfish Survey 4VWX Yellowtail Biomass (kg/tow) July 1995

Fig. 26.

4X Yellowtail Summer Survey Mean Niss Per Tow



4X Yellowtail Survey Length Frequencies (%)



4X Yellowtail Survey Length Frequencies

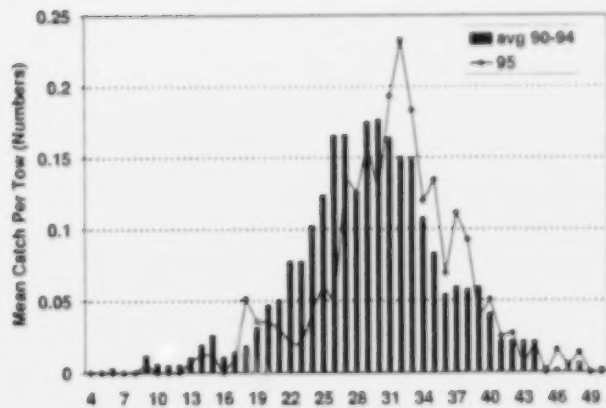


Fig. 27.

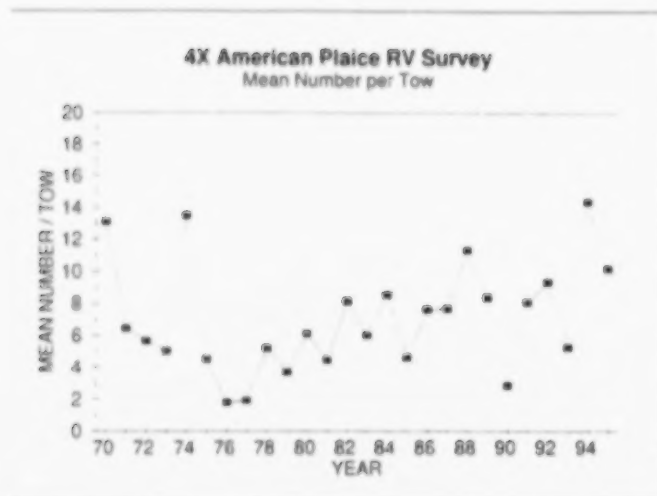


Fig. 28.

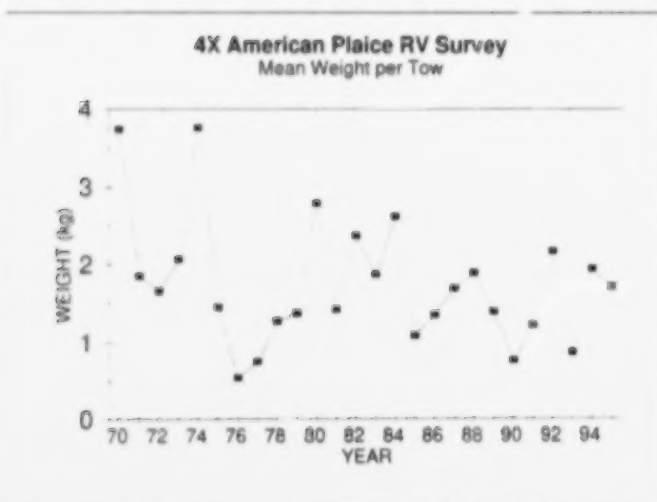


Fig. 29.

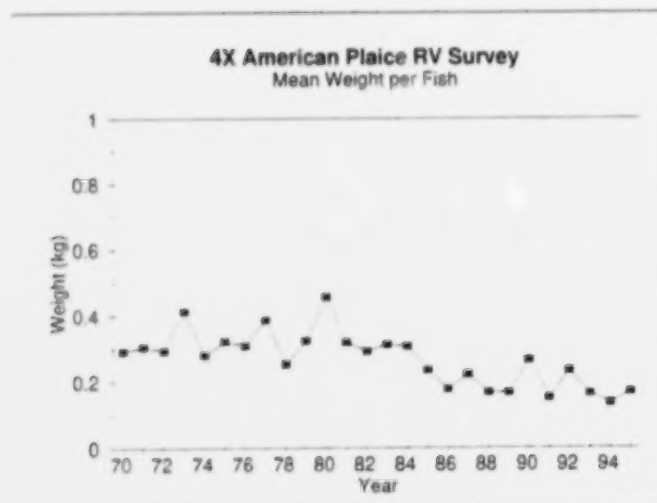
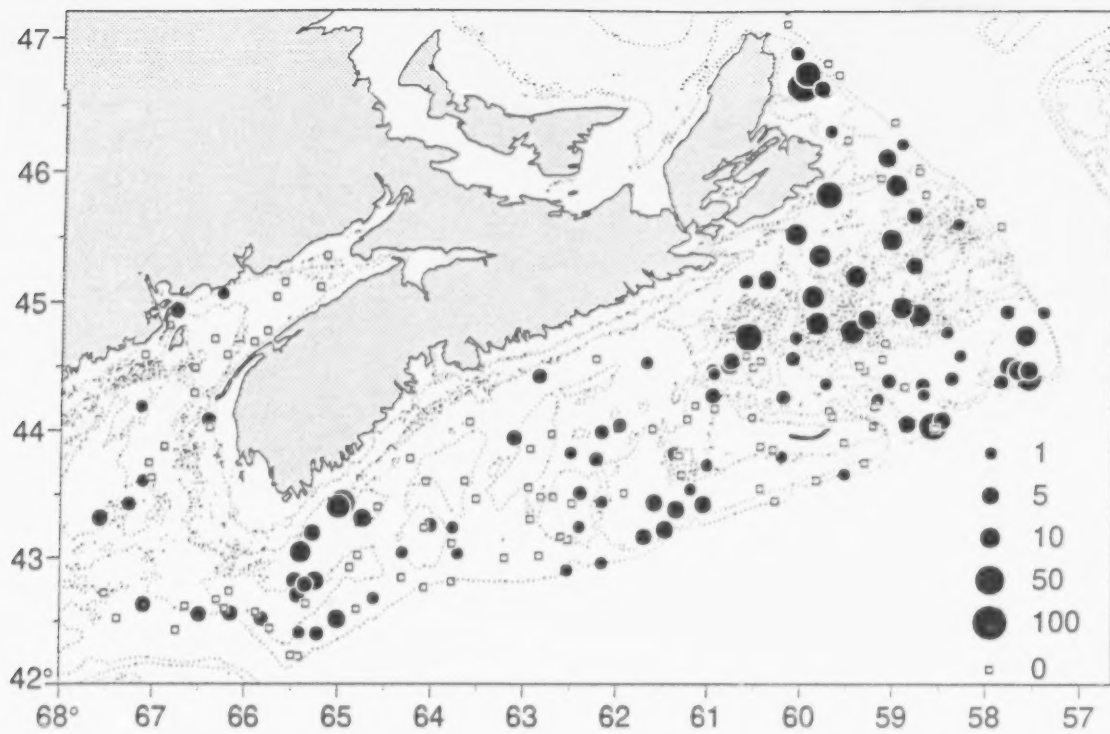
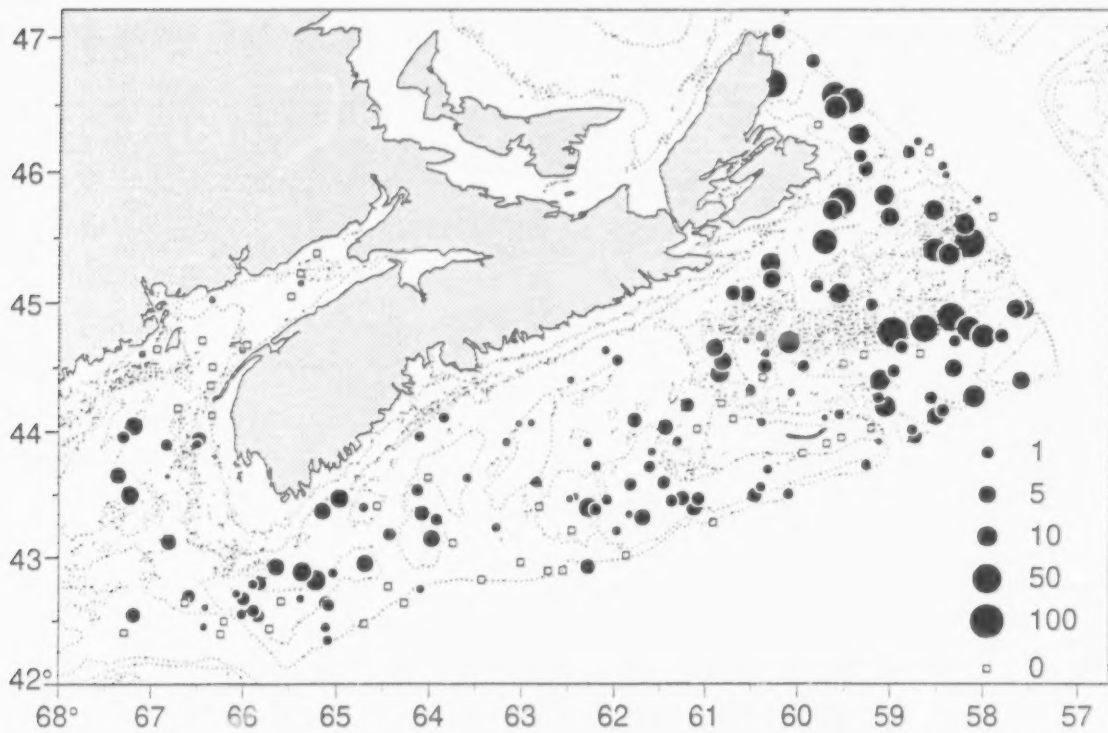


Fig. 30.



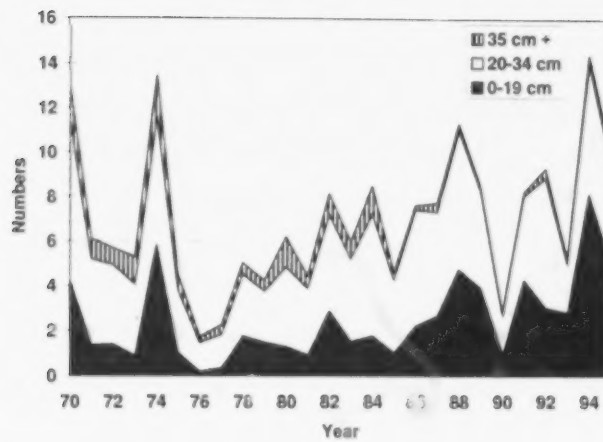
Summer Groundfish Survey 4VWX Plaice Biomass (kg/tow) July 1994



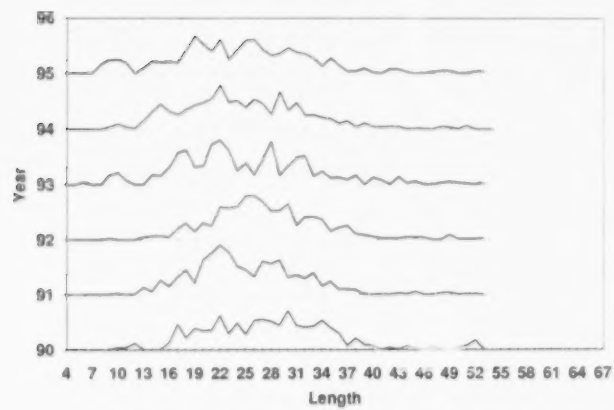
Summer Groundfish Survey 4VWX Plaice Biomass (kg/tow) July 1995

Fig. 31.

4X Plaice Summer Survey Mean Nos Per Tow



4X Plaice Survey Length Frequencies (%)



4X Plaice Survey Length Frequencies

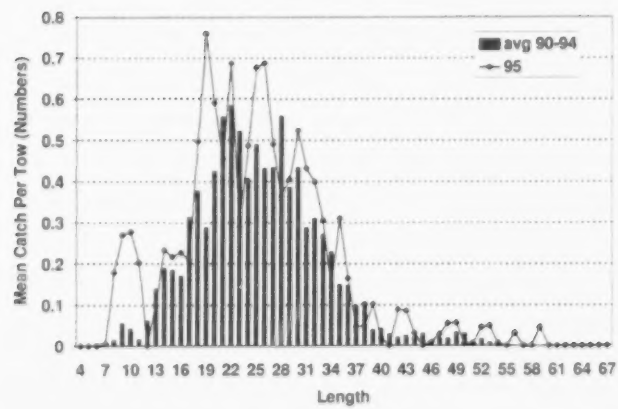


Fig. 32.

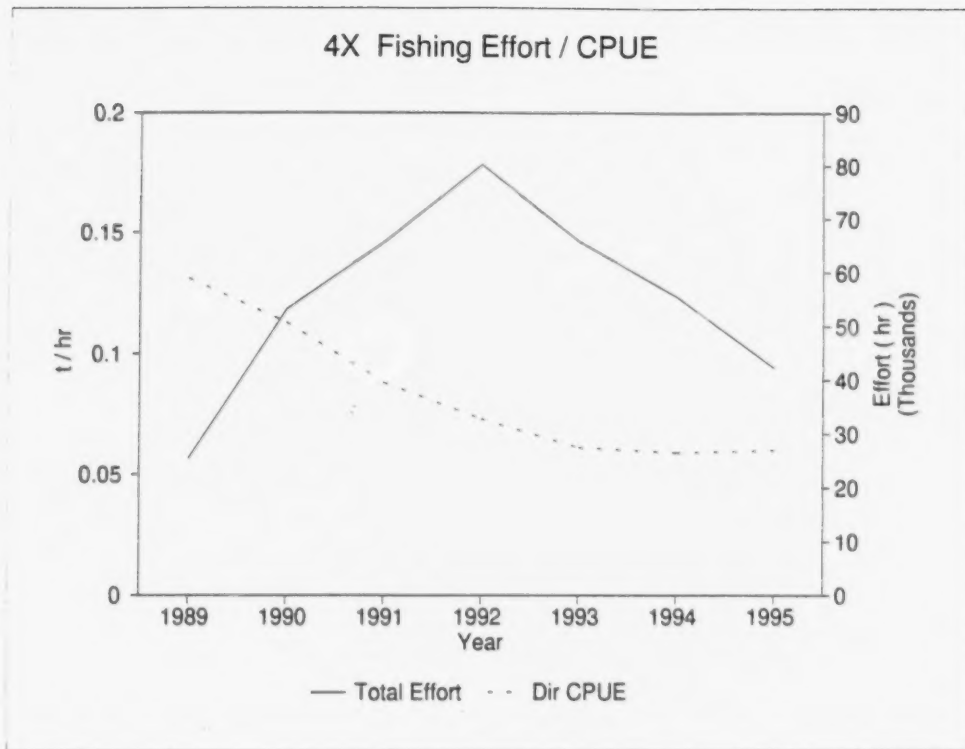


Fig. 33a.

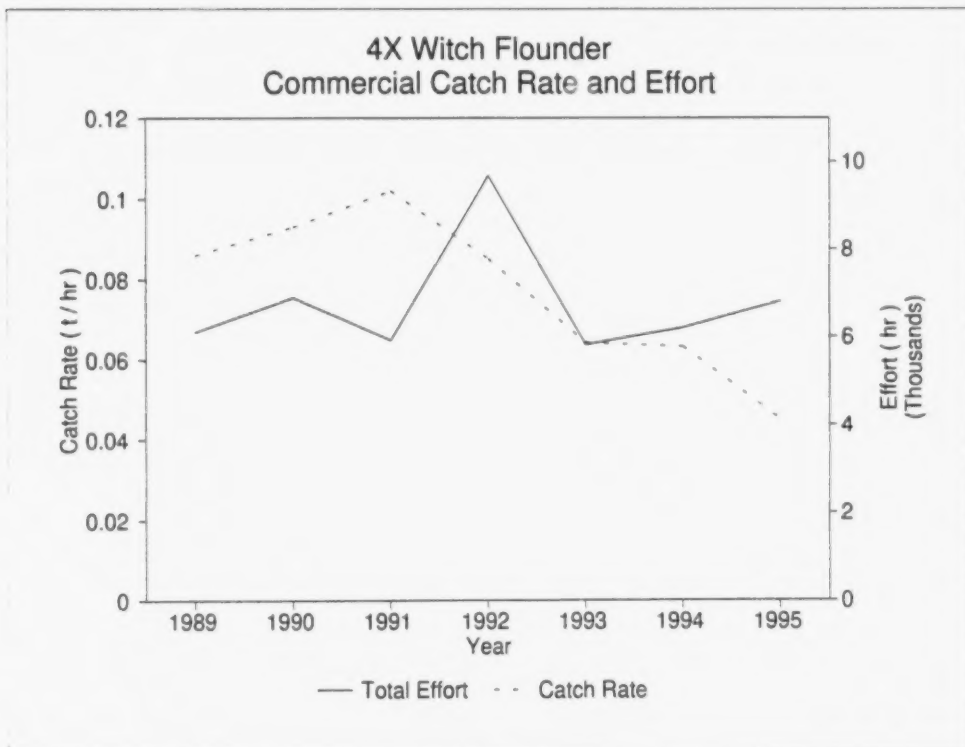


Fig. 33b.

1995 Commercial Catch for Witch

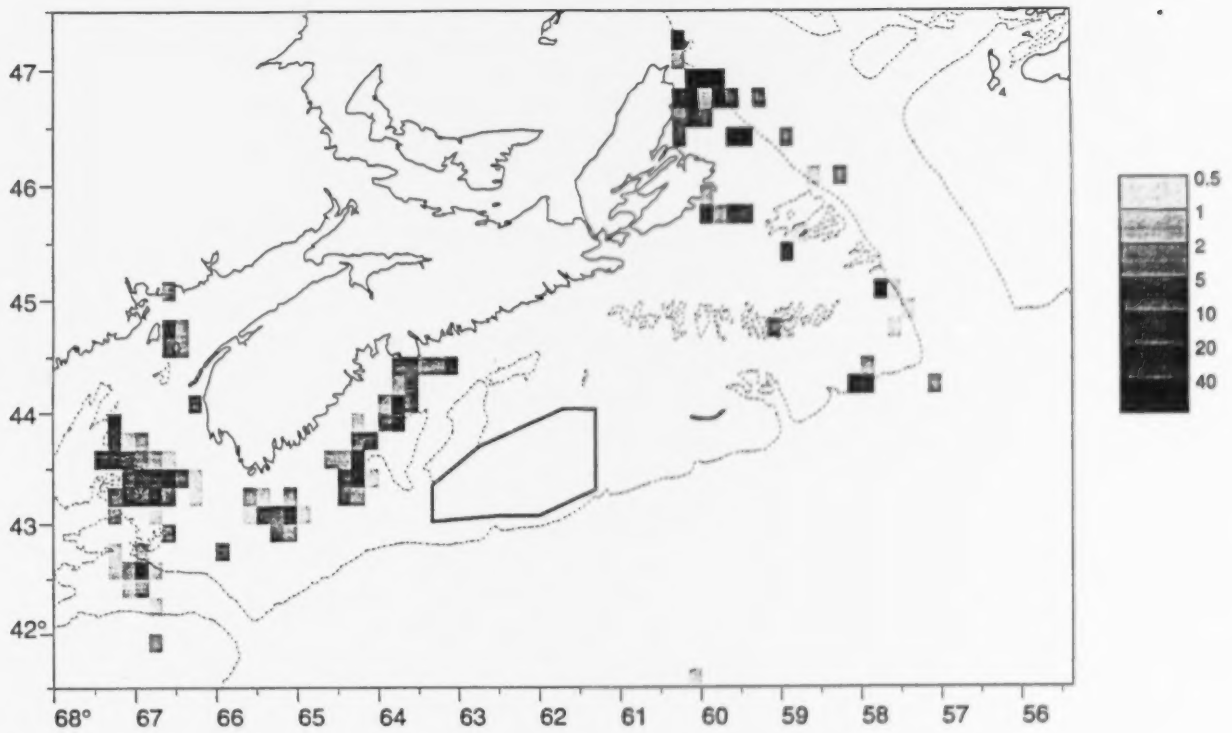


Fig. 34.

1995 Commercial Catch for Winter

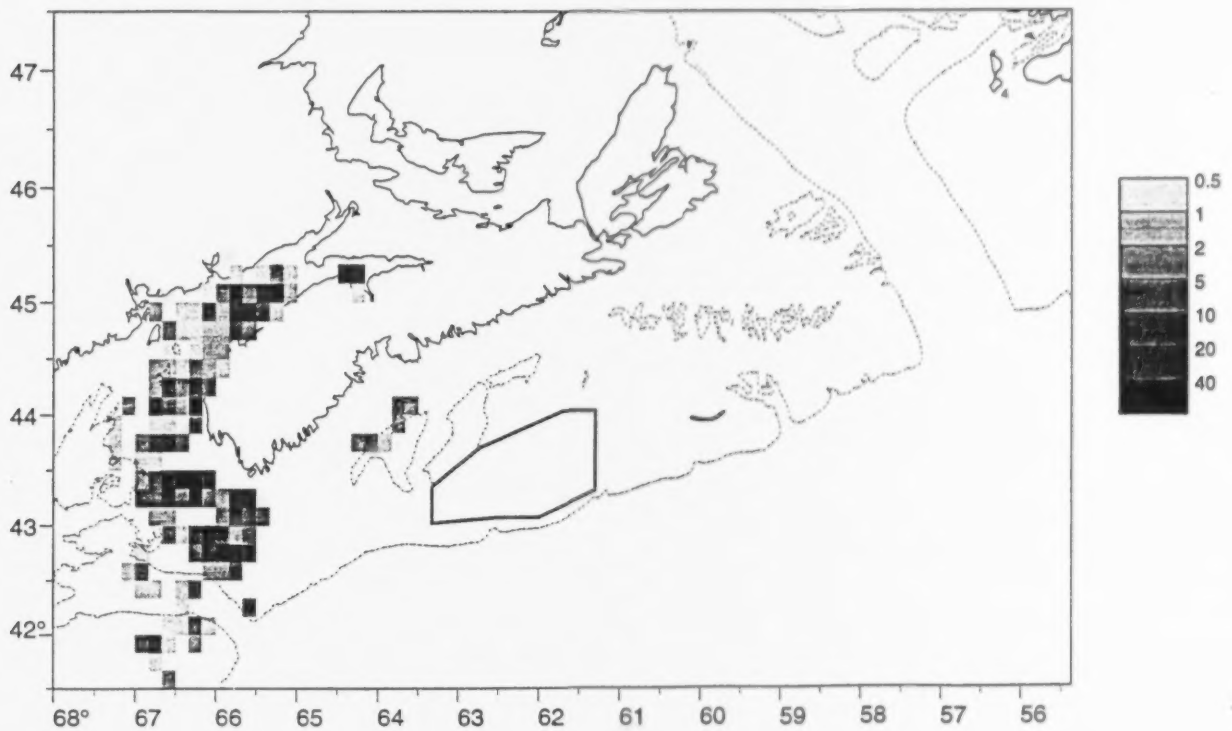


Fig. 35.

1995 Commercial Catch for Plaice

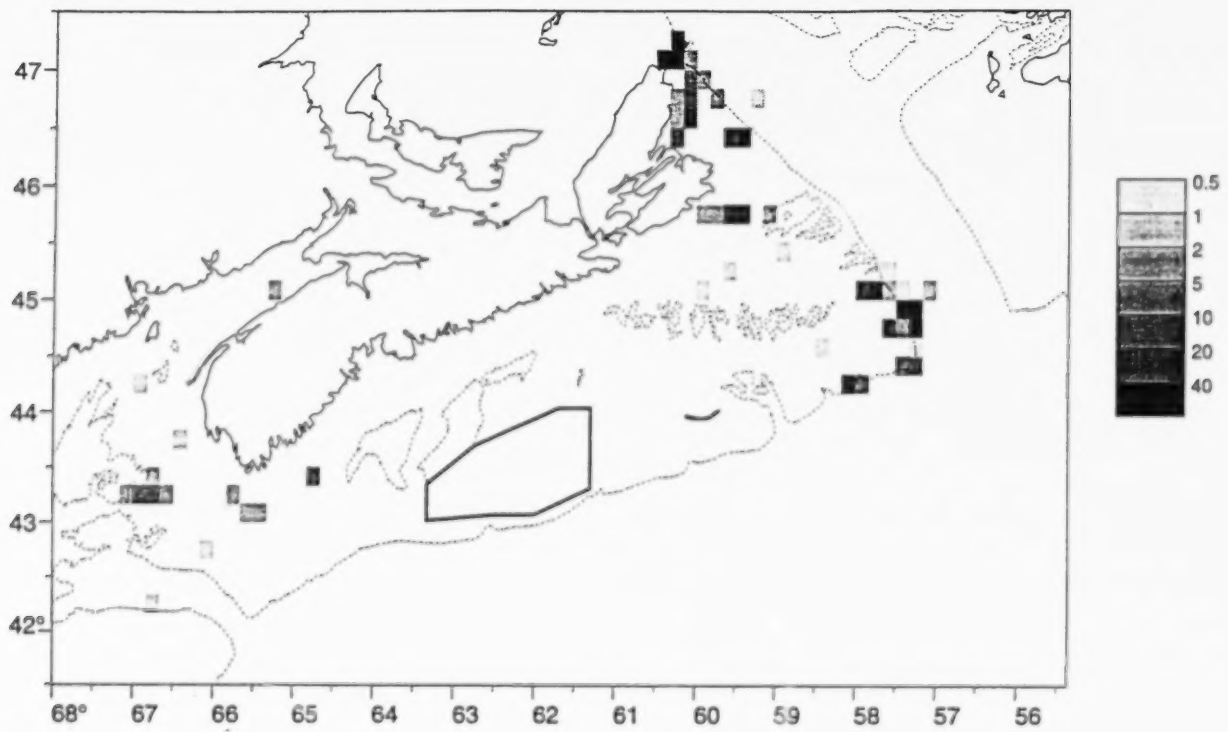


Fig. 36.

1995 Commercial Catch for Yellowtail

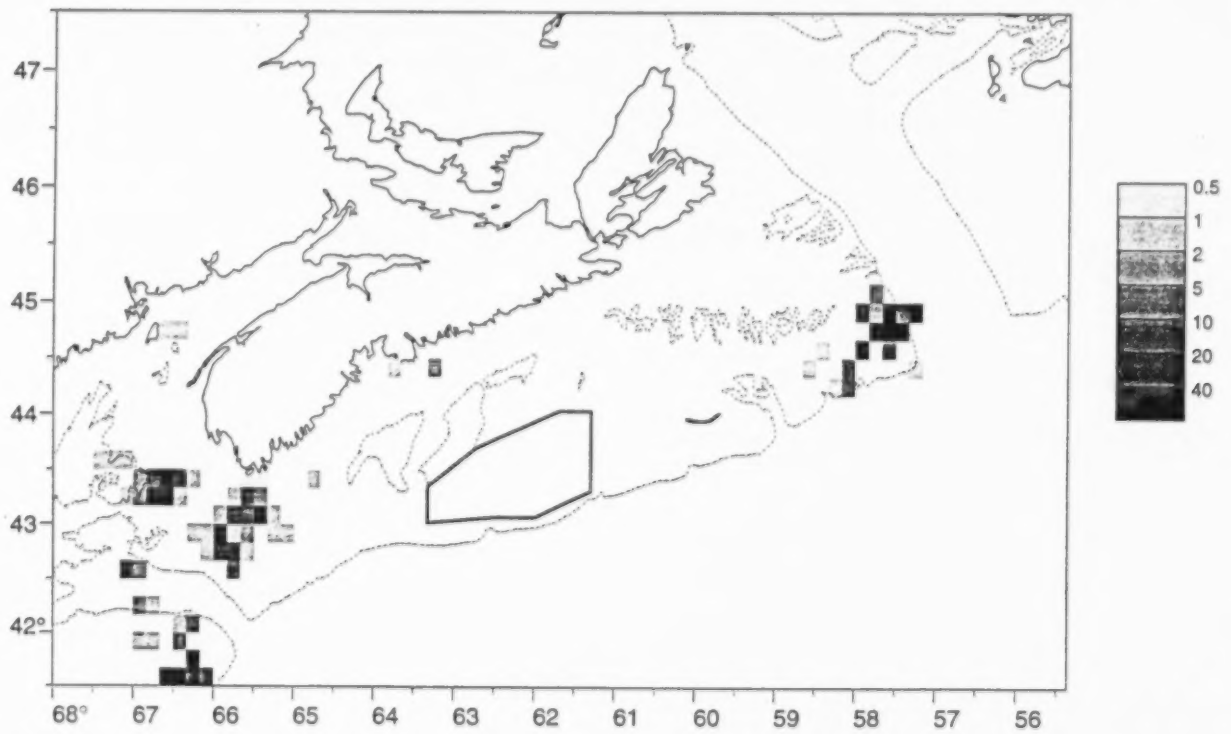


Fig. 37.

1995 Commercial Catch for Unspecified

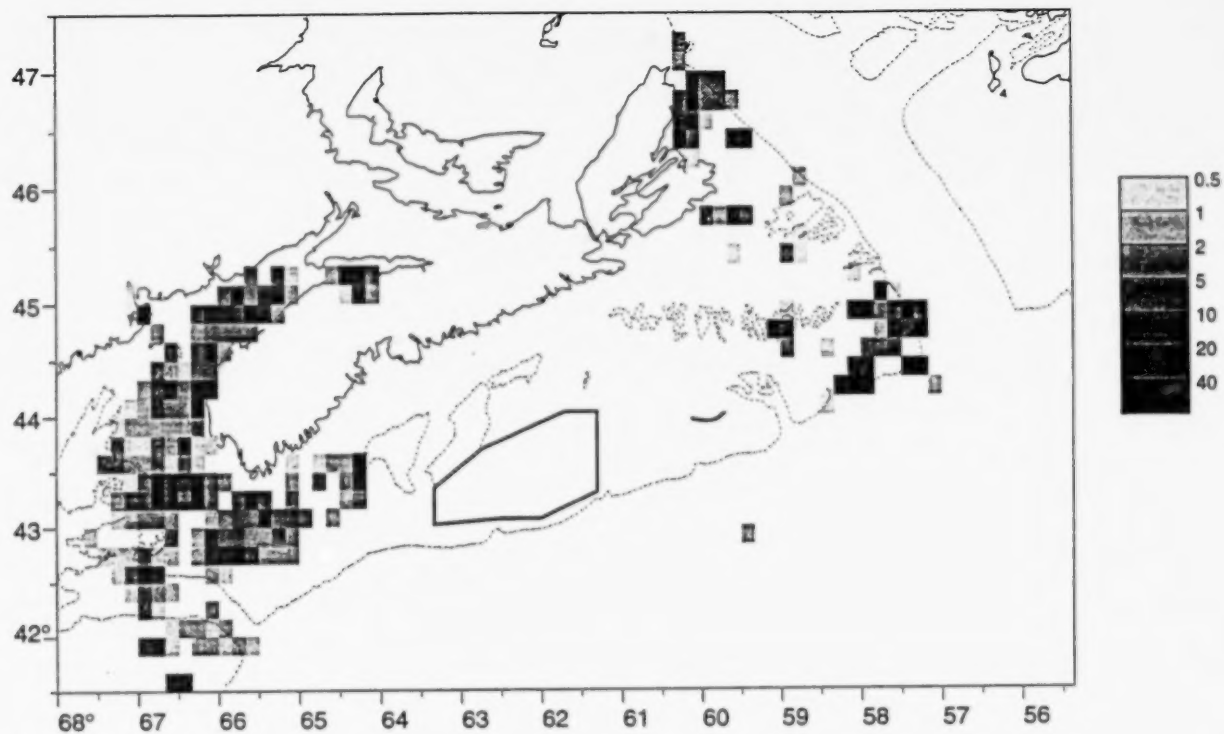
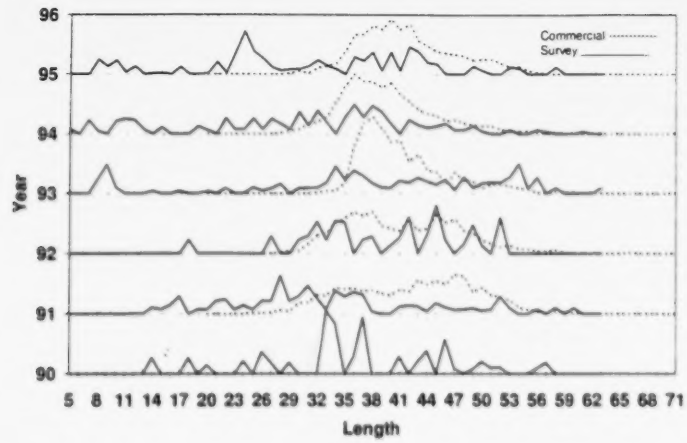
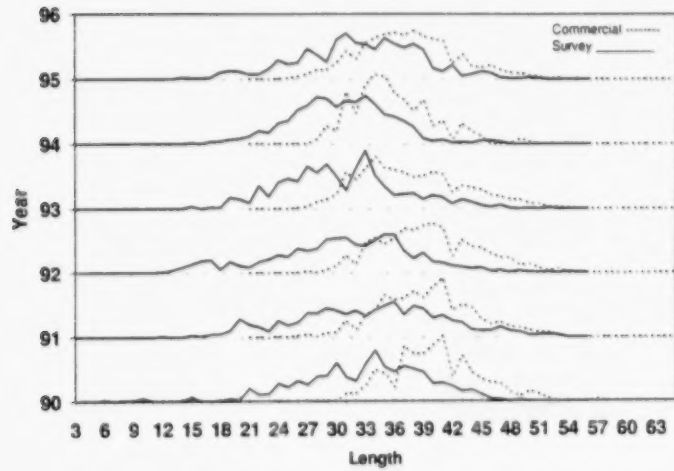


Fig. 38.

4X Witch Flounder Length Frequencies



4X Winter Flounder Length Frequencies



4X Plaice Length Frequencies

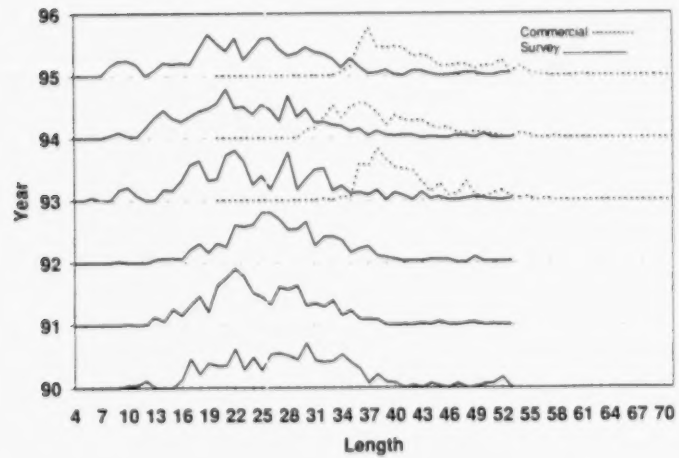


Fig. 39.